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**A HISTORY OF VISIBILITY PROTECTION:
THE STRUGGLE AGAINST COMPLEXITY**

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I. Introduction

It is not unkind to say, from the standpoint of scenery alone, that if many, and indeed most, of our American national parks were to be set down on the continent of Europe thousands of Americans would journey all the way across the ocean in order to see their beauties.¹

Many national parks and wilderness areas, particularly those in the Southwestern United States, are known for their unique and beautiful scenery.² Millions of people visit these areas each year to view their spectacular scenic vistas.³ In 1977, Congress made the protection of visibility in these areas a national priority.⁴ Part II of this article provides an overview of the history and purpose of visibility regulation, and Part III describes the scientific basis for such regulation. Part IV discusses the early years of visibility protection; Part V evaluates visibility protection in the 1990s; and Part VI discusses EPA's recent efforts at dealing with the visibility problem.

II. Overview of Visibility Protection

Visibility protection is an attempt to take environmental protection beyond public health, and protect air quality on an ecosystem level.⁵ The origins of the Clean Air Act

¹ Franklin D. Roosevelt, *in* THE WIT AND WISDOM OF FRANKLIN D. ROOSEVELT, ON AMERICA 6 (Peter and Helen Beilenson eds., Peter Pauper Press) (1982).

² NATIONAL RESEARCH COUNCIL, PROTECTING VISIBILITY IN NATIONAL PARKS AND WILDERNESS AREAS 19 (1993).

³ *Id.*; Vickie Patton & Bruce Polkowski, *The EPA's Regional Haze Proposal: Protecting Visibility in National Parks and Wilderness Areas*, 11 TUL. ENVTL. L.J. 299, 302 (1998). The National Park Service (NPS) reported that there were over 285 million visitors to NPS lands in 2000. NATIONAL PARK SERVICE PUBLIC USE STATISTICS OFFICE, NATIONAL PARK SERVICE STATISTICAL ABSTRACT 2000 iv (2000), at <http://www2.nature.nps.gov/stats/abst2000.pdf>. Of that number, almost 4.5 million visited Grand Canyon National Park. *Id.* at x.

⁴ CAA § 169A, 42 U.S.C. § 7491 (2000).

⁵ ARNOLD W. REITZE, JR., AIR POLLUTION CONTROL LAW: COMPLIANCE & ENFORCEMENT § 5-1(a) (forthcoming 2001); *see* CAA § 101, 42 U.S.C. § 7401 (2000).

designed to prevent significant deterioration of air quality in areas that met the NAAQS, and created classifications for such areas.¹² The cleanest areas, designated Class I, were those areas where almost any degradation of air quality would be significant.¹³ Class II was the designation for areas where deterioration from modest growth would be considered insignificant.¹⁴ In order to protect air quality in Class I and Class II areas, the regulations limited allowable increases in pollutant concentrations to certain levels over baseline concentrations.¹⁵ Class III areas, on the other hand, were allowed increases up to the NAAQS.¹⁶ All areas were initially designated Class II, unless and until reclassified with notice, public hearings, and EPA approval.¹⁷ The 1974 regulations also provided special permitting requirements for eighteen types of new sources.¹⁸

The 1974 PSD regulations became the basis for the provisions on visibility found in the CAA Amendments of 1977.¹⁹ When it enacted the PSD provisions, Congress also required the identification of mandatory Class I areas in which visibility was considered

¹² Prevention of Significant Air Quality Deterioration, 39 Fed. Reg. 42,510, 42,515 (Dec. 5, 1974).

¹³ *Id.*

¹⁴ *Id.*

¹⁵ *Id.* Baseline concentrations were the sum of 1974 levels of SO₂ and particulates, adjusted for new sources that had been approved, but were not operating before January 1, 1975. *Id.* at 42,514-42,515.

¹⁶ Prevention of Significant Air Quality Deterioration, 39 Fed. Reg. 42,510, 42,515 (Dec. 5, 1974).

¹⁷ *Id.*

¹⁸ *Id.* at 42,516.

¹⁹ Pub. L. No. 95-95, § 128, 91 Stat. 685, 742-745 (Aug. 7, 1977) (adding § 169A); CAA § 169A, 42 U.S.C. § 7491 (2000). Section 169A was enacted first. Pub. L. No. 95-95, § 128, 91 Stat. 685, 742-745 (Aug. 7, 1977) (adding § 169A). Section 169B was enacted in the 1990 Amendments. Pub. L. No. 101-549, § 816, 104 Stat. 2,399, 2,695 (adding § 169B); CAA § 169B, 42 U.S.C. § 7492 (2000). *See also* ARNOLD W. REITZE, JR., AIR POLLUTION CONTROL LAW: COMPLIANCE & ENFORCEMENT § 5-1(b) (forthcoming 2001).

an important value.²⁰ These Class I areas were specifically afforded protection under the visibility provisions in section 169A.²¹ The visibility regulations promulgated in 1980 further addressed visibility impairment that reasonably could be traced to existing stationary sources or small groups of existing stationary sources.²² The 1990 Amendments also added protections for Class I areas in section 169B by requiring more studies and authorizing the creation of visibility transport commissions with the ability to make recommendations to EPA for further regulatory action.²³

III. The Science of Visibility

“From a scientific and technical point of view, deterioration of visual air quality is probably the best understood and most easily measured effect of air pollution.”²⁴

Visibility research has focused generally on anthropogenic causes of visibility impairment.²⁵ Anthropogenic causes are those that are “[d]erived from human

²⁰ Pub. L. No. 95-95, § 128, 91 Stat. 685, 742-745 (Aug. 7, 1977) (adding § 169A); CAA § 169A, 42 U.S.C. § 7491 (2000); U.S. GEN. ACCOUNTING OFFICE, PROTECTING PARKS AND WILDERNESS FROM NEARBY POLLUTION SOURCES 1, 12 (1990) [GAO/RCED-90-10]. Mandatory Class I areas were defined as Federal areas which may not be designated other than Class I under the PSD program. CAA § 169A(g)(5), 42 U.S.C. § 7491(g)(5) (2000). These were international parks, wilderness areas exceeding 5,000 acres, national memorial parks exceeding 5,000 acres, and national parks exceeding 6,000 acres. CAA § 162(a), 42 U.S.C. § 7472(a) (2000). EPA ultimately determined that visibility was an important value in 156 of the 158 areas that qualified as mandatory Class I areas. National Visibility Goal for Federal Class I Areas, Identification of Mandatory Class I Federal Areas Where Visibility is an Important Value, 44 Fed. Reg. 69,122 (Nov. 30, 1979); *see infra* note 85.

²¹ Pub. L. No. 95-95, § 128, 91 Stat. 685, 742-745 (adding § 169A); CAA § 169A, 42 U.S.C. § 7491 (2000); U.S. GEN. ACCOUNTING OFFICE, PROTECTING PARKS AND WILDERNESS FROM NEARBY POLLUTION SOURCES 12 (1990) [GAO/RCED-90-10].

²² Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084 (Dec. 2, 1980).

²³ Pub. L. No. 101-549, § 816, 104 Stat. 2,399, 2,695 (adding § 169B); CAA § 169B, 42 U.S.C. § 7492 (2000).

²⁴ ENVTL. PROT. AGENCY, PUB. NO. EPA-450/5-79-008, PROTECTING VISIBILITY, AN EPA REPORT TO CONGRESS 3 (1979).

²⁵ *See generally* ENVTL. PROT. AGENCY, PUB. NO. EPA-450/5-79-008, PROTECTING VISIBILITY, AN EPA REPORT TO CONGRESS (1979); U.S. NAT'L RESEARCH COUNCIL, HAZE IN THE GRAND CANYON: AN EVALUATION OF THE WINTER HAZE INTENSIVE TRACER EXPERIMENT (1990).

activities.”²⁶ They can be divided into three general categories: 1) widespread, homogenous haze which reduces visibility in all directions from an observer’s point of view; 2) smoke, dust, or plumes of colored gas that obscure the sky or horizon relatively close to their sources;²⁷ and 3) bands or layers of discoloration or haze that appear above surrounding area.²⁸ “Anthropogenic [visibility] impairment may be frequent, last for long time periods, and be readily apparent to all observers.”²⁹

Generally, the major cause of visibility impairment is the suspension of fine particles in the air.³⁰ Suspended particles and liquid droplets typically are referred to as atmospheric aerosols.³¹ Fine particles, ranging from 0.1 to 1.0 micrometers in diameter, scatter and absorb light, causing the viewer to perceive haze.³² Particles of that size range are most efficient at scattering light because their diameters are similar to the wavelength of light.³³ Sulfates ($\text{SO}_4^{=}$) can account for a large portion of the fine particle

²⁶ ENVTL. PROT. AGENCY, PUB. NO. EPA-450/5-79-008, PROTECTING VISIBILITY, AN EPA REPORT TO CONGRESS 2 (1979).

²⁷ This is also referred to as plume blight. *Id.*

²⁸ *Id.* at 2, 1-10.

²⁹ *Id.* at 2.

³⁰ U.S. NAT’L RESEARCH COUNCIL, HAZE IN THE GRAND CANYON: AN EVALUATION OF THE WINTER HAZE INTENSIVE TRACER EXPERIMENT 9 (1990); ENVTL. PROT. AGENCY, PUB. NO. EPA-450/5-79-008, PROTECTING VISIBILITY, AN EPA REPORT TO CONGRESS 3, 2-23 (1979).

³¹ U.S. NAT’L RESEARCH COUNCIL, HAZE IN THE GRAND CANYON: AN EVALUATION OF THE WINTER HAZE INTENSIVE TRACER EXPERIMENT 9 (1990); ENVTL. PROT. AGENCY, PUB. NO. EPA-450/5-79-008, PROTECTING VISIBILITY, AN EPA REPORT TO CONGRESS 3, 9, 2-9 (1979).

³² U.S. NAT’L RESEARCH COUNCIL, HAZE IN THE GRAND CANYON: AN EVALUATION OF THE WINTER HAZE INTENSIVE TRACER EXPERIMENT 9 (1990).

³³ ENVTL. PROT. AGENCY, PUB. NO. EPA-450/5-79-008, PROTECTING VISIBILITY, AN EPA REPORT TO CONGRESS 2-9, 2-17 (1979).

concentration in the air.³⁴ $\text{SO}_4^{=}$ are formed from the atmospheric transformation of sulfur dioxide (SO_2) emissions from human activities.³⁵ Even small increases in particle concentration can affect visibility.³⁶ Nitrogen dioxide (NO_2) is also an important anthropogenic cause of visibility impairment.³⁷ In addition, air molecules, humidity, weather and natural emissions also affect visibility.³⁸

A person's judgment of damage to visibility is a function of their ability to see form, texture and color from various distances.³⁹ Visibility can be described in terms of contrast, discoloration, visual range and light extinction.⁴⁰ Contrast refers to the relative brightness of different parts of a scene.⁴¹ The eye normally senses differences in light intensity relative to an overall intensity level.⁴² For example, a candle in a well-lit room does not appear very bright, but is very noticeable in a dark room.⁴³ Discoloration refers

³⁴ See U.S. NAT'L RESEARCH COUNCIL, HAZE IN THE GRAND CANYON: AN EVALUATION OF THE WINTER HAZE INTENSIVE TRACER EXPERIMENT 9 (1990).

³⁵ U.S. NAT'L RESEARCH COUNCIL, HAZE IN THE GRAND CANYON: AN EVALUATION OF THE WINTER HAZE INTENSIVE TRACER EXPERIMENT 9-10 (1990).

³⁶ See U.S. NAT'L RESEARCH COUNCIL, HAZE IN THE GRAND CANYON: AN EVALUATION OF THE WINTER HAZE INTENSIVE TRACER EXPERIMENT 9 (1990).

³⁷ ENVTL. PROT. AGENCY, PUB. NO. EPA-450/5-79-008, PROTECTING VISIBILITY, AN EPA REPORT TO CONGRESS 3 (1979). Nitrogen oxides are precursors to NO_2 and nitrate aerosols. NATIONAL RESEARCH COUNCIL, PROTECTING VISIBILITY IN NATIONAL PARKS AND WILDERNESS AREAS 54 (1993).

³⁸ ENVTL. PROT. AGENCY, PUB. NO. EPA-450/5-79-008, PROTECTING VISIBILITY, AN EPA REPORT TO CONGRESS 3, 9 (1979).

³⁹ U.S. NAT'L RESEARCH COUNCIL, HAZE IN THE GRAND CANYON: AN EVALUATION OF THE WINTER HAZE INTENSIVE TRACER EXPERIMENT 43 (1990).

⁴⁰ *Id.*

⁴¹ *Id.*

⁴² ENVTL. PROT. AGENCY, PUB. NO. EPA-450/5-79-008, PROTECTING VISIBILITY, AN EPA REPORT TO CONGRESS 2-1 (1979).

⁴³ *Id.*

to shifts in wavelengths of light as it moves through the air.⁴⁴ Visual range refers to the farthest distance at which an observer can distinguish a large black object on the horizon.⁴⁵ Observers typically will notice a two percent or greater contrast between large dark objects and the horizon sky.⁴⁶ Early studies indicated that observers could detect a two percent to five percent change in contrast caused by air pollution, indicating that a mere two percent reduction in contrast may cause a noticeable reduction in visual range.⁴⁷ In some Class I areas in the Southwest, visibility can approach the theoretical limit of 200 miles.⁴⁸ In such areas, visibility is extremely sensitive to air pollution.⁴⁹

Light extinction, also referred to as the extinction coefficient, is the amount of light lost for each unit of distance light travels through the air.⁵⁰ EPA has defined the extinction coefficient as being directly related to visual air quality, representing the optical characteristics of pollutants in the line of sight.⁵¹ The extinction coefficient, in combination with the visual aspects of the object being viewed and its illumination, determine the object's contrast against the background, and therefore the object's

⁴⁴ U.S. NAT'L RESEARCH COUNCIL, HAZE IN THE GRAND CANYON: AN EVALUATION OF THE WINTER HAZE INTENSIVE TRACER EXPERIMENT 43 (1990).

⁴⁵ *Id.*

⁴⁶ ENVTL. PROT. AGENCY, PUB. NO. EPA-450/5-79-008, PROTECTING VISIBILITY, AN EPA REPORT TO CONGRESS 3, 6, 2-3 (1979).

⁴⁷ *Id.* at 6.

⁴⁸ *Id.*

⁴⁹ *Id.*

⁵⁰ U.S. NAT'L RESEARCH COUNCIL, HAZE IN THE GRAND CANYON: AN EVALUATION OF THE WINTER HAZE INTENSIVE TRACER EXPERIMENT 43 (1990).

⁵¹ ENVTL. PROT. AGENCY, PUB. NO. EPA-450/5-79-008, PROTECTING VISIBILITY, AN EPA REPORT TO CONGRESS 3-1 (1979).

visibility.⁵² In other words, the extinction coefficient relates to optical effects of air quality, and contrast is the optical characteristic of visibility.⁵³

Of the indicators of visibility, the extinction coefficient is the one that is most directly related to atmospheric composition.⁵⁴ The amount of light extinction is determined by the amount of light that is scattered and absorbed by particles and gases in the air.⁵⁵ More specifically, light extinction is determined by four factors--scattering by gas molecules, absorption by gas molecules, scattering by particles, and absorption by particles.⁵⁶ Scattering by gas molecules is almost entirely attributable to nitrogen and oxygen in the air.⁵⁷ Pollutant gases do not affect this, because their concentrations are low in relation to the amount of oxygen and nitrogen in the air.⁵⁸ Absorption by gas molecules is attributable solely to NO₂, which is the only significant trace gas that absorbs light.⁵⁹ Scattering by particles is caused primarily by fine particles ranging from 0.1 to 1.0 micrometers in size.⁶⁰ Many suspended particle pollutants fall into this size

⁵² *Id.*

⁵³ *Id.*

⁵⁴ U.S. NAT'L RESEARCH COUNCIL, HAZE IN THE GRAND CANYON: AN EVALUATION OF THE WINTER HAZE INTENSIVE TRACER EXPERIMENT 43 (1990).

⁵⁵ *Id.*

⁵⁶ *Id.* at 43-44.

⁵⁷ *Id.* at 43. This is referred to as Rayleigh scattering, or natural light scatter. *Id.*

⁵⁸ *Id.* at 43-44.

⁵⁹ *Id.* at 44. NO₂ is a brownish, highly reactive gas, and precursor to ozone. U.S. NAT'L RESEARCH COUNCIL, NITROGEN OXIDES 5 (1977). The effects of NO₂ are important because it is a major component of urban plumes. ENVTL. PROT. AGENCY, PUB. NO. EPA-450/5-79-008, PROTECTING VISIBILITY, AN EPA REPORT TO CONGRESS 2-9 (1979). Ozone is a component and indicator of photochemical smog. ARNOLD W. REITZE, JR., AIR POLLUTION CONTROL LAW: COMPLIANCE & ENFORCEMENT § 2-1(e) (forthcoming 2001).

⁶⁰ U.S. NAT'L RESEARCH COUNCIL, HAZE IN THE GRAND CANYON: AN EVALUATION OF THE WINTER HAZE INTENSIVE TRACER EXPERIMENT 44 (1990).

range.⁶¹ Light absorption by particles is caused almost exclusively by particles of black carbon.⁶² Pollutants that scatter and absorb light reduce the amount of light received from viewed objects, and scatter ambient light in the line of sight.⁶³ The scattering of ambient light is perceived as haze.⁶⁴ Discoloration can result because the effects of visibility impairment vary with the wavelength of light.⁶⁵

In the absence of airborne particles, visibility is limited by the natural scattering of light by air molecules.⁶⁶ This is known as Rayleigh scattering, which is what causes the sky to look blue.⁶⁷ If visibility were only limited by Rayleigh scattering, visual range would be approximately 330 to 400 kilometers.⁶⁸ However, visibility begins to degrade when particles amount to as little as a few tenths of a microgram per cubic meter ($\mu\text{g}/\text{m}^3$).⁶⁹ Above this level, light extinction, visual range, color and contrast all are significantly degraded.⁷⁰ During haze episodes, particles can cause light extinction at two or more times the level of natural conditions.⁷¹

⁶¹ *Id.* Suspended particles in a gas are commonly referred to as aerosols. *Id.* at 9.

⁶² *Id.* at 44.

⁶³ ENVTL. PROT. AGENCY, PUB. NO. EPA-450/5-79-008, PROTECTING VISIBILITY, AN EPA REPORT TO CONGRESS 3 (1979).

⁶⁴ *Id.*

⁶⁵ *Id.*

⁶⁶ U.S. NAT'L RESEARCH COUNCIL, HAZE IN THE GRAND CANYON: AN EVALUATION OF THE WINTER HAZE INTENSIVE TRACER EXPERIMENT 44 (1990).

⁶⁷ ENVTL. PROT. AGENCY, PUB. NO. EPA-450/5-79-008, PROTECTING VISIBILITY, AN EPA REPORT TO CONGRESS 2-9 (1979).

⁶⁸ U.S. NAT'L RESEARCH COUNCIL, HAZE IN THE GRAND CANYON: AN EVALUATION OF THE WINTER HAZE INTENSIVE TRACER EXPERIMENT 44 (1990).

⁶⁹ *Id.*

⁷⁰ *Id.*

EPA described the visibility problem in somewhat different, more simplified terms when it promulgated visibility regulations in 1980.⁷² In its rulemaking, EPA described two types of air pollution that impair visibility.⁷³ The first included smoke, dust, colored gas plumes or layered haze emitted from stacks that obscure the sky or horizon and can be attributed to single sources or small groups of sources.⁷⁴ The second type was described as a regionally homogenous haze from many sources that impairs visibility over a large area.⁷⁵ EPA has articulated the impacts of visibility impairment as causing discoloration of the air in the form of a visible plume, whitening of the horizon and reduction in the observer's ability to discern objects and textures, and the obscuring of some portion of the landscape by a discernible plume.⁷⁶

IV. The Early Years of Visibility Protection

A. The Clean Air Act of 1977

1. Section 169A

The 1977 CAA Amendments added section 169A.⁷⁷ In section 169A(a)(1), Congress declared a national goal of remedying existing visibility impairment⁷⁸ in mandatory Class I areas and preventing any future impairment caused by man-made air

⁷¹ *Id.*

⁷² Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,085 (Dec. 2, 1980).

⁷³ *Id.*

⁷⁴ *Id.*

⁷⁵ *Id.*

⁷⁶ *Id.*

⁷⁷ Pub. L. No. 95-95, § 128, 91 Stat. 685, 742-745 (Aug. 7, 1977).

pollution.⁷⁹ Mandatory Class I areas were defined as federal areas which could not be designated other than Class I under the PSD program and included international parks, wilderness areas exceeding 5,000 acres, national memorial parks exceeding 5,000 acres, and national parks exceeding 6,000 acres.⁸⁰ The Secretary of the Interior, in consultation with other Federal land managers, was required to review all mandatory Class I areas within six months of enactment and "identify those where visibility is an important value ..."⁸¹ EPA was further required to promulgate a list of mandatory Class I areas where the Administrator had determined visibility to be an important value.⁸²

EPA's list of mandatory Class I areas was required to be published no later than August 7, 1978, but was not actually published until November 30, 1979.⁸³ In its background comments on the listing, EPA noted that there were 158 areas meeting the general criteria enacted in section 169A.⁸⁴ Based on the list published by the Department

⁷⁸ Visibility impairment was defined in the statute as reduction in visual range and atmospheric discoloration. CAA § 169A(g)(6), 42 U.S.C. § 7491(g)(6) (2000).

⁷⁹ CAA § 169A(a)(1), 42 U.S.C. § 7491(a)(1) (2000). Man-made air pollution was defined as air pollution directly or indirectly caused by human activities. CAA § 169A(g)(3), 42 U.S.C. § 7491(g)(3) (2000). Congress specifically stated that meeting the national goal was *not* a non-discretionary duty for the purposes of citizen suits. CAA § 169A(f), 42 U.S.C. § 7491(f) (2000); *see* CAA § 304, 42 U.S.C. § 7604(a)(2).

⁸⁰ CAA § 162(a), 42 U.S.C. § 7472(a) (2000); CAA § 169A(g)(5), 42 U.S.C. § 7491(g)(5) (2000).

⁸¹ CAA § 169A(a)(2), 42 U.S.C. § 7491(a)(2) (2000). Section 169A was enacted and effective on August 7, 1977. Pub. L. No. 95-95, § 406(d)(1), 91 Stat. 685, 796 (Aug. 7, 1977).

⁸² CAA § 169A(a)(2), 42 U.S.C. § 7491(a)(2) (2000). The text of section 169A(a)(2) refers to the "Administrator," defined as the Administrator of the Environmental Protection Agency. CAA § 302(a), 42 U.S.C. § 7602(a) (2000).

⁸³ CAA § 169A(a)(2), 42 U.S.C. § 7491(a)(2) (2000); National Visibility Goal for Federal Class I Areas, Identification of Mandatory Class I Federal Areas Where Visibility Is an Important Value, 44 Fed. Reg. 69,122 (Nov. 30, 1979) (codifying 40 C.F.R. Part 81, Subpart D).

⁸⁴ National Visibility Goal for Federal Class I Areas, Identification of Mandatory Class I Federal Areas Where Visibility Is an Important Value, 44 Fed. Reg. 69,122 (Nov. 30, 1979) (codifying 40 C.F.R. Part 81, Subpart D).

of Interior, EPA determined that visibility was an important value in 156 of the 158 mandatory Class I areas.⁸⁵ The criteria used in developing the list centered on the presence of scenic value and the effects of natural visibility impairment.⁸⁶ More specifically, the task force which developed the list looked at whether the legislation creating the Class I area stated that scenic value was important; whether actual scenic values existed that were important to public enjoyment; whether the relevant scenery was in the form of panoramic background, intermediate, or foreground views; whether natural sources of visibility impairment had a serious effect on the public's ability to appreciate visibility; and, if natural sources of impairment seriously affected the public's appreciation of the area's scenic value, whether such scenic value was great enough to warrant control of man-made pollution sources.⁸⁷

By February 7, 1979, EPA was required to complete a study and report to Congress on what methods were available for implementing the goal described in section

⁸⁵ *Id.* The Department of Interior determined initially that visibility was an important value in 153 of the 158 areas. Identification of Mandatory Class I Federal Areas where Visibility is an Important Value, 42 Fed. Reg. 55,280, 55,282-55,287 (Oct. 14, 1977). However, it changed the list to include 156 areas after applying revised criteria developed in response to public comment received on the initial list. Final Identification of Mandatory Class I Federal Areas where Visibility is an Important Value, 43 Fed. Reg. 7,721, 7,724-7,726 (Feb. 24, 1978); National Visibility Goal for Federal Class I Areas, Identification of Mandatory Class I Federal Areas Where Visibility Is an Important Value, 44 Fed. Reg. 69,122 (Nov. 30, 1979) (codifying 40 C.F.R. Part 81, Subpart D). The three areas added to the list were Mammoth Cave National Park, Kentucky, Moosehorn Wilderness, Maine, and Medicine Lake Wilderness, Montana. National Visibility Goal for Federal Class I Areas, Identification of Mandatory Class I Federal Areas Where Visibility Is an Important Value, 44 Fed. Reg. 69,122 (Nov. 30, 1979) (codifying 40 C.F.R. Part 81, Subpart D). The two areas left out of the final list were Rainbow Lake, Wisconsin, and Bradwell Bay, Florida. *Id.* at 69,122. These areas did not possess any vistas extending outside their boundaries, and did not otherwise meet the criteria used for determining whether visibility was an important value. *Id.* at 69,123, 69,124; *see infra* notes 87, 94 and accompanying text.

⁸⁶ National Visibility Goal for Federal Class I Areas, Identification of Mandatory Class I Federal Areas Where Visibility Is an Important Value, 44 Fed. Reg. 69,122 (Nov. 30, 1979) (codifying 40 C.F.R. Part 81, Subpart D).

⁸⁷ *Id.* The revised criteria included a determination that visibility was not an important value in areas where views primarily were of foreground features less than one mile distant. *Id.* According to EPA, one mile is the shortest distance at which a person can experience a broad perception of an area. *Id.*

169A(a)(1).⁸⁸ The report was required to include recommendations for characterizing and measuring visibility, modeling techniques for determining potential visibility impairment, prevention methods and remedies.⁸⁹ The report was also required to categorize sources and pollutants that may cause or significantly contribute to visibility impairment.⁹⁰

2. EPA's 1979 Report to Congress

EPA published its report to Congress in October of 1979.⁹¹ It began by establishing a definition of visibility impairment drawn from the science of visibility.⁹² Anthropogenic visibility impairment was defined as "any perceptible change in visibility (visual range, contrast, atmospheric color, or other conveniently measured visibility index) from that which would have existed under natural conditions."⁹³ In addition, the EPA took the position that some vistas extending outside the boundaries of Class I areas were important to visitor experience, and therefore were part of the visibility value of the area.⁹⁴ EPA concluded that such vistas should be included in the national goal.⁹⁵ EPA

⁸⁸ CAA § 169A(a)(3), 42 U.S.C. § 7491(a)(3) (2000).

⁸⁹ *Id.*

⁹⁰ *Id.*

⁹¹ ENVTL. PROT. AGENCY, PUB. NO. EPA-450/5-79-008, PROTECTING VISIBILITY, AN EPA REPORT TO CONGRESS i (1979).

⁹² *Id.* at 2, 1-9, 2-1.

⁹³ *Id.* at 2, 1-16.

⁹⁴ *Id.* at 2. Such vistas became known as "integral vistas" under the rules promulgated in 1980. Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,086, 80,090 (Dec. 2, 1980) (codified at 40 C.F.R. § 51.301(n)).

⁹⁵ ENVTL. PROT. AGENCY, PUB. NO. EPA-450/5-79-008, PROTECTING VISIBILITY, AN EPA REPORT TO CONGRESS 2, 7-2 (1979).

also concluded that, as far as pollution control decisions were concerned, a change in visibility must be perceptible in order to be considered significant or adverse.⁹⁶

The report also provided an analysis of the current state of visibility in Class I areas.⁹⁷ The EPA concluded that the best visibility occurred in the mountains of the Southwest, where median visibility exceeds 70 miles on an annual basis.⁹⁸ Visibility dropped to 15 miles in areas east of the Mississippi River and south of the Great Lakes, and is lower in the summer.⁹⁹ While EPA's report was being prepared, the Federal Land Managers provided EPA with a preliminary analysis on visibility in Class I areas.¹⁰⁰ In the context of that analysis, about one-third of the Federal Land Managers reported that visibility conditions in Class I areas under their jurisdictions were undesirable or needed evaluation for human impacts.¹⁰¹ The remaining two-thirds reported acceptable visibility conditions, but it still appeared that visibility in almost all Class I areas was affected by at least some amount of human activity.¹⁰² Over ninety percent of the Federal Land Managers reported that there were important views from within Class I areas looking outside those areas.¹⁰³ In general, the Federal Land Managers identified the following sources of visibility impairment: agricultural burning and dust; forest product

⁹⁶ *Id.* at 2.

⁹⁷ *Id.* at 2, 7-1 to 7-8.

⁹⁸ *Id.* at 2, 7-4.

⁹⁹ *Id.*

¹⁰⁰ *Id.* at 3, 7-1. The Federal Land Managers involved were the National Park Service, Fish and Wildlife Service, and Forest Service. *Id.* at 7-1.

¹⁰¹ *Id.* at 3, 7-2.

¹⁰² *Id.*

¹⁰³ *Id.* at 3, 7-7.

development (saw mills, pulp and paper mills); visible plumes from miscellaneous point sources; natural sources (wildfires, fog, dust, natural haze); power plants (plumes and regional effects); prescribed fires¹⁰⁴; smelters; and urban pollution.¹⁰⁵

EPA concluded that the preliminary analysis performed by the Federal Land Managers had several implications for pollution control programs.¹⁰⁶ First, areas that had, or were projected to have, unacceptable visibility deserved the highest priority.¹⁰⁷ However, EPA did not perceive from the Federal Land Managers a strong indication that it would be necessary to eliminate all perceptible visibility impairment, because the Federal Land Managers reported acceptable visibility in two-thirds of Class I areas.¹⁰⁸ Second, although Federal Land Managers reported the existence of important vistas extending outside Class I areas, there was no clear Congressional intent to remedy haze in large urban areas that could be seen from Class I areas.¹⁰⁹ Third, sources that impair visibility were known to be very diverse, and pollution control programs must be developed accordingly.¹¹⁰ Fourth, new sources of visibility-impairing pollutants deserved the highest priority for programs to measure and control their impacts, since it

¹⁰⁴ See discussion *infra* Parts V.B.2(d, f), V.D.1.

¹⁰⁵ ENVTL. PROT. AGENCY, PUB. NO. EPA-450/5-79-008, PROTECTING VISIBILITY, AN EPA REPORT TO CONGRESS 7-7 (1979).

¹⁰⁶ *Id.* at 10, 7-2 to 7-8.

¹⁰⁷ *Id.* at 10, 7-7.

¹⁰⁸ *Id.* at 10, 7-2, 7-7.

¹⁰⁹ *Id.* at 10, 7-7.

¹¹⁰ *Id.* at 10, 7-7 to 7-8.

would be difficult to limit such impacts after the sources became operational.¹¹¹ EPA asserted that the available scientific information indicated PSD programs would not always provide adequate protection for visibility.¹¹²

EPA emphasized the need for visibility monitoring to establish a baseline for evaluating the impacts of new sources or new controls.¹¹³ Monitoring would also be necessary for comparing the impacts of natural sources and human sources of air pollutants, identifying sources of impairment, and determining whether a visibility protection program was effective.¹¹⁴ EPA recommended that monitoring programs in Class I areas include three components.¹¹⁵ First, baseline monitoring should be conducted for at least one year.¹¹⁶ Second, visibility monitoring should use several methods, including color photography, human observation, an integrating nephelometer, and a multi-wavelength telephotometer.¹¹⁷ Third, such monitoring should evaluate relationships between human sources and natural sources using a particulate sampler, meteorological measurements, and an NO₂ monitor when necessary.¹¹⁸

¹¹¹ *Id.* at 10, 7-8.

¹¹² *Id.*

¹¹³ *Id.* at 6, 3-1.

¹¹⁴ *Id.*

¹¹⁵ *Id.* at 7, 3-4.

¹¹⁶ *Id.* EPA noted that the time period should be one with typical weather patterns. *Id.*

¹¹⁷ *Id.* An integrating nephelometer measures light scattering caused by particles, estimating the extinction coefficient. *Id.* at 6, 3-3, 3-4. A multi-wavelength telephotometer measures contrast between an object being viewed and the horizon or other objects, and can be used at distances up to 100 kilometers. *Id.* at 6, 3-2 to 3-3, 3-4.

¹¹⁸ *Id.* at 7, 3-4.

EPA asserted that achieving the national visibility goal depended largely on identifying emission sources that cause visibility impairment.¹¹⁹ Since fine particles were considered the principal cause of visibility impairment, identifying sources of haze generally could be achieved by identifying sources of fine particle emissions.¹²⁰ In addition, some fine particles were known to be water-soluble, so high humidity could significantly increase the light scattering effect of those particles.¹²¹ EPA also found that most fine particles were formed in the air from gaseous air pollutants such as sulfur oxides, nitrogen oxides and organics.¹²² So, fine particles in the atmosphere are secondary to the original emissions of gaseous pollutants, making it difficult to measure them at their sources.¹²³ Moreover, the formation of the secondary particles depends on factors that are not constant, such as sunlight, other pollutants, and humidity.¹²⁴ Once formed, fine particles can stay in the atmosphere for a week or more, and can be transported more than 500 kilometers.¹²⁵ Such transport causes unpredictable results, because the particles interact with emissions from other sources.¹²⁶

¹¹⁹ *Id.* at 7, 4-1.

¹²⁰ *Id.*

¹²¹ *Id.*

¹²² *Id.* EPA noted that there had been observations of the transformation of SO₂ to sulfate particles in Eastern and Western plumes from large power plants, smelters, and major urban areas. *Id.* at 8. EPA also noted that the importance of volatile organics (hydrocarbons) in visibility impairment was not well understood. *Id.* at 10.

¹²³ *Id.* at 7, 4-1.

¹²⁴ *Id.*

¹²⁵ *Id.* EPA noted that aircraft measurements of plumes from large power plants, smelters and major urban areas had tracked visibility impacts from such sources 200 or more kilometers downwind. *Id.* at 8, 4-32, 4-37.

¹²⁶ *Id.* at 7, 4-1.

This complexity led EPA to conclude that there was a need for several methods of assessing visibility impairment, including evaluation of the chemical composition of haze, analysis of historical trends, analysis of the relationship between wind and haze, plume sampling, and modeling.¹²⁷ After applying these methods to actual data, EPA reached several conclusions.¹²⁸ The primary conclusion was that fine sulfate particles accounted for thirty to sixty percent of the visibility impairment related to particles.¹²⁹ Historical evidence indicated that changes in visibility in the East were caused at least partially by changes in sulfate concentrations in the air and sulfur oxide emissions.¹³⁰ More specifically, close parallels were found between airport visibility trends and trends in coal use, sulfur oxide emissions, and sulfate concentrations in the atmosphere.¹³¹ In the Southwest, a similar parallel was found between sulfur oxide emissions from copper smelters, pollution controls, reduced production, and visibility improvement from 1972 to 1976.¹³² With regard to modeling, EPA concluded that visibility models should be used to evaluate visibility impacts from point sources, despite the inherent uncertainties in such models.¹³³

¹²⁷ *Id.* at 7, 4-2.

¹²⁸ *Id.* at 7 to 8, 4-15 to 4-28.

¹²⁹ *Id.* at 8.

¹³⁰ *Id.* at 8, 4-17.

¹³¹ *Id.*

¹³² *Id.* at 8; *see generally id.* at 4-17 to 4-27.

¹³³ ENVTL. PROT. AGENCY, PUB. NO. EPA-450/5-79-008, PROTECTING VISIBILITY, AN EPA REPORT TO CONGRESS 9, 5-17 (1979). The noted uncertainties included: decreased reliability as distance from the source increases; difficulties with mountainous terrain; difficulties in predicting chemical transformations in the atmosphere; uncertainties in the understanding of human visual perception; the lack of data relating to baseline conditions; the lack of emissions inventories; and limits in the understanding of meteorological phenomena. *Id.* at 9, 5-9, 5-15, 5-17.

EPA's ultimate conclusion in its report to Congress was that it needed to adopt a phased approach to visibility protection.¹³⁴ There were several reasons for this conclusion, including the lack of baseline data, limitations on scientific and technical understanding of the subject, the need to consider costs, and limitations on resources for developing control programs.¹³⁵ In the first phase, EPA recommended that state control programs focus on "the most clearly defined cases of existing impairment, and on strategies to prevent future impairment"¹³⁶ After this initial phase, state programs would allow for changes in guidelines and control strategies as scientific understanding of visibility impairment improved.¹³⁷ However, EPA expressed specific concern over the limitations of Best Available Retrofit Technology (BART), which did not appear to apply to important sources of visibility impairment, such as prescribed fire, regional power generation emissions, regional smelter emissions, and urban plumes.¹³⁸ In the long term, visibility protection would have to overcome the limitations of BART and PSD programs, and integrate visibility into routine air pollution management.¹³⁹

3. Requirements for Further Regulation

By August 7, 1979, after notice and public hearings, EPA was required to promulgate regulations to assure reasonable progress in meeting the national goals of preventing and remedying visibility impairment, as well as assuring compliance with

¹³⁴ *Id.* at 11, 7-9, 7-10.

¹³⁵ *Id.* at 11.

¹³⁶ *Id.* at 11, 7-9.

¹³⁷ *Id.*

¹³⁸ *Id.* at 11, 7-13.

¹³⁹ *Id.* at 11, 7-13, 7-16.

section 169A.¹⁴⁰ Those regulations were required to provide guidelines to the states on appropriate methods for implementing section 169A.¹⁴¹ The guidelines were intended, in pari, to provide the basis for emissions limitations on fossil-fuel fired power plants exceeding 750 megawatts of generating capacity.¹⁴² Also, the regulations were to require states with Class I areas to add provisions to their SIPs that were necessary to make reasonable progress toward achieving the national visibility goals.¹⁴³

SIPs also had to be changed in states with emissions that could reasonably be anticipated to contribute to visibility impairment in any Class I area.¹⁴⁴ Thus, the section 169A visibility requirements were intended in part to deal with interstate transport of pollution that could impair visibility in any Class I area, regardless of location.¹⁴⁵ Before holding public hearings on SIP modifications, states were required to consult in person with all appropriate Federal land managers,¹⁴⁶ and include any conclusions or recommendations of those managers in public notices relating to SIP modifications.¹⁴⁷

Congress provided two examples of measures that states would be required to add to their SIPs in order to achieve section 169A's goals.¹⁴⁸ Major sources that had not been

¹⁴⁰ CAA § 169A(a)(4), 42 U.S.C. § 7491(a)(4) (2000).

¹⁴¹ CAA § 169A(b)(1), 42 U.S.C. § 7491(b)(1) (2000).

¹⁴² CAA § 169A(b)(2), 42 U.S.C. § 7491(b)(2) (2000).

¹⁴³ *Id.*

¹⁴⁴ *Id.*

¹⁴⁵ *Id.*; see Vickie L. Patton, *The New Air Quality Standards, Regional Haze, and Interstate Air Pollution Transport*, 28 ENVTL. L. REP. 10155, 10172 (1998).

¹⁴⁶ "Federal land manager" is defined as the Secretary of the department with authority over lands of the United States. CAA § 302(i), 42 U.S.C. § 7602(i) (2000).

¹⁴⁷ CAA § 169A(d), 42 U.S.C. § 7491(d) (2000).

¹⁴⁸ CAA § 169A(b)(2), 42 U.S.C. § 7491(b)(2) (2000).

operating for more than fifteen years as of August 7, 1977 and emitted pollutants reasonably anticipated to contribute to visibility impairment were required to install BART.¹⁴⁹ In addition, states were required to adopt long-term strategies of ten to fifteen years in duration that projected reasonable progress toward meeting the goals of section 169A.¹⁵⁰

EPA was authorized to exempt sources from the BART requirement if it determined that the source would not by itself, or in combination with other sources, emit any pollutants that may reasonably be anticipated to contribute to visibility impairment in a Class I area.¹⁵¹ An exemption could not be granted for any fossil-fuel fired power plant with a design capacity of 750 megawatts or more, unless the owner or operator could demonstrate that it was located at such a distance from any Class I area that it would not impair visibility in such an area, either by itself or in conjunction with other sources.¹⁵²

¹⁴⁹ CAA § 169A(b)(2)(A), 42 U.S.C. § 7491(b)(2)(A) (2000). EPA was required to consider several factors in determining BART and emission limitations based on BART. CAA § 169A(g)(2), 42 U.S.C. § 7491(g)(2) (2000). These factors were the costs of compliance, the energy and non-air quality environmental impacts of compliance, existing pollution control technology used at the pollution source, the remaining useful life of the source, and the reasonably anticipated degree of improvement in visibility. *Id.* BART was required to be installed “as expeditiously as practicable.” CAA § 169A(b)(2)(A), 42 U.S.C. § 7491(b)(2)(A) (2000). Congress defined this to mean “as expeditiously as practicable[,] but in no event later than five years after the date of [an approved SIP revision].” CAA § 169A(g)(4), 42 U.S.C. § 7491(g)(4) (2000). Congress also provided an independent definition for the term “major stationary source,” which listed several types of sources with the potential to emit 250 tons or more of any pollutant each year. CAA § 169A(g)(7), 42 U.S.C. § 7491(g)(7) (2000). The list included fossil-fuel fired steam electric plants and fossil-fuel boilers with heat inputs of more than 250 million British thermal units per hour, municipal incinerators capable of charging more than 250 tons of refuse per day, ore smelting activities, petroleum refineries, fuel conversion plants, and several other industrial activities. CAA § 169A(g)(4), 42 U.S.C. § 7491(g)(4) (2000).

¹⁵⁰ CAA § 169A(b)(2)(B), 42 U.S.C. § 7491(b)(2)(B) (2000). In determining reasonable progress, EPA was required to consider the costs of compliance, the time necessary for compliance, the energy and non-air quality impacts of compliance, and the remaining useful life of the source. CAA § 169A(g)(2), 42 U.S.C. § 7491(g)(2) (2000).

¹⁵¹ CAA § 169A(c)(1), 42 U.S.C. § 7491(c)(1) (2000). Exemptions could only be granted by rule, after notice and public comment. *Id.*

¹⁵² CAA § 169A(c)(2), 42 U.S.C. § 7491(c)(2) (2000).

In essence, power plants of 750 megawatts or more were presumed to impair visibility unless they could prove otherwise.¹⁵³ Moreover, the appropriate Federal land manager had to concur with any such exemption.¹⁵⁴

4. CAA Section 165(d)

Additional visibility protections were created in the Prevention of Significant Deterioration provisions, specifically section 165(d).¹⁵⁵ Under section 165(d)(2), EPA was required to notify the appropriate Federal Land Manager and Federal Official of permit applications for facilities which might affect Class I areas.¹⁵⁶ The Federal Land Manager and Federal Official were given the affirmative responsibility to protect air quality related values of Class I areas, including visibility.¹⁵⁷ They also were required to consider, in consultation with EPA, whether proposed major sources would have adverse impacts on such values.¹⁵⁸ States were prohibited from issuing permits in any cases

¹⁵³ See CAA §§ 169A(c)(1), 169A(c)(2), 42 U.S.C. §§ 7491(c)(1), 7491(c)(2) (2000).

¹⁵⁴ CAA § 169A(c)(3), 42 U.S.C. § 7491(c)(3) (2000).

¹⁵⁵ CAA § 165(d), 42 U.S.C. § 7475(d) (2000).

¹⁵⁶ CAA § 165(d)(2)(A), 42 U.S.C. § 7475(d)(2)(A) (2000).

¹⁵⁷ CAA § 165(d)(2)(B), 42 U.S.C. § 7475(d)(2)(B) (2000).

¹⁵⁸ CAA § 165(d)(2)(B), 42 U.S.C. § 7475(d)(2)(B) (2000). The Federal Land Managers Air Quality Related Values Work Group recently released a report outlining procedures for defining air quality related values and determining impacts of sources on Class I areas. Federal Land Managers Air Quality Related Values Work Group, Notice of Availability of Final Report, 66 Fed. Reg. 382 (Jan. 3, 2001); *Emitters Face More Frequent Tests of Effect on Wilderness Areas*, CLEAN AIR REP., Jan. 18, 2001. This has been viewed as a step toward codifying consistent procedures among the Federal Land Managers. Federal Land Managers Air Quality Related Values Work Group, Notice of Availability of Final Report, 66 Fed. Reg. 382 (Jan. 3, 2001); *Emitters Face More Frequent Tests of Effect on Wilderness Areas*, CLEAN AIR REP., Jan. 18, 2001. The report includes thresholds for determining impacts of sources near Class I areas, detailed provisions on visibility issues, guidelines for reviewing New Source Review applications, and recommendations for evaluating air quality related values. Federal Land Managers Air Quality Related Values Work Group, Notice of Availability of Final Report, 66 Fed. Reg. 382 (Jan. 3, 2001); *Emitters Face More Frequent Tests of Effect on Wilderness Areas*, CLEAN AIR REP., Jan. 18, 2001. The Federal Land Managers expected the guidance to apply to permit applications and modeling protocols after April 1, 2001.

where EPA, the Governor of an adjacent state containing a Class I area, or the appropriate Federal Land Manager or Federal official notified the permitting state that the proposed facility might contribute to a change in the air quality of a Class I area.¹⁵⁹ In such a case, a permit could be issued only if the owner or operator could demonstrate that particulate matter and SO₂ emissions would not contribute to concentrations that would exceed the maximum allowable increases of those pollutants for the Class I area.¹⁶⁰

Even if such emissions would not exceed the maximum allowable increase for the Class I area, the Federal Land Manager could stop the issuance of a permit by demonstrating that emissions from the proposed facility would have an adverse impact on air quality related values, including visibility.¹⁶¹ The owner or operator could avoid this result by demonstrating to the Federal Land Manager that emissions would not have an adverse effect on such values.¹⁶² The state could then issue a permit.¹⁶³ However, a permit issued under those circumstances was required to include emissions limitations necessary to ensure that particulate and SO₂ emissions would not contribute to concentrations that would exceed the allowable increases for those pollutants.¹⁶⁴

Federal Land Managers Air Quality Related Values Work Group, Notice of Availability of Final Report, 66 Fed. Reg. 382, 383 (Jan. 3, 2001).

¹⁵⁹ CAA § 165(d)(2)(C)(i), 42 U.S.C. § 7475(d)(2)(C)(i) (2000).

¹⁶⁰ *Id.*

¹⁶¹ CAA § 165(d)(2)(C)(ii), 42 U.S.C. § 7475(d)(2)(C)(ii) (2000).

¹⁶² CAA § 165(d)(2)(C)(iii), 42 U.S.C. § 7475(d)(2)(C)(iii) (2000).

¹⁶³ *Id.*

¹⁶⁴ CAA § 165(d)(2)(C)(iv), 42 U.S.C. § 7475(d)(2)(C)(iv) (2000). The allowable increases for particulate matter were set at 19 µg/m³ (annual geometric mean) and 37 µg/m³ (twenty-four-hour maximum). *Id.* The allowable increases for SO₂ were set at 20 µg/m³ (annual arithmetic mean), 91 µg/m³ (twenty-four-hour maximum), and 325 µg/m³ (three-hour maximum). *Id.*

The Governor of the state with the Class I area was allowed to grant a variance from the SO₂ limit, if the facility owner or operator could demonstrate that its permit was denied solely because of the twenty-four-hour SO₂ limitation.¹⁶⁵ Also, if the area concerned was a mandatory Class I area, the owner or operator had to demonstrate that variance would not adversely affect air quality related values of the Class I area (including visibility).¹⁶⁶ Any variance required the concurrence of the Federal Land Manager.¹⁶⁷ If the Federal Land Manager did not concur with the Governor's recommended variance, the matter was required to be sent to the President, who could approve the variance if he found it to be in the national interest.¹⁶⁸ Any permit issued with a variance was required to include emissions limitations designed to keep SO₂ increases within more stringent limits above baseline levels.¹⁶⁹

B. The 1980 Regulations

It was not until December 2, 1980 that EPA published final regulations on visibility protection for Class I areas.¹⁷⁰ As it recommended in its report to Congress,

¹⁶⁵ CAA § 165(d)(2)(D)(i), 42 U.S.C. § 7475(d)(2)(D)(i) (2000).

¹⁶⁶ *Id.*

¹⁶⁷ *Id.*

¹⁶⁸ CAA § 165(d)(2)(D)(ii), 42 U.S.C. § 7475(d)(2)(D)(ii) (2000).

¹⁶⁹ CAA § 165(d)(2)(D)(iii), 42 U.S.C. § 7475(d)(2)(D)(iii) (2000). The maximum allowable increases for permits issued under variance were set at 36 µg/m³ (twenty-four-hour maximum), and 130 µg/m³ (three-hour maximum) for low terrain areas, and 62 µg/m³ (twenty-four-hour maximum), and 221 µg/m³ (three-hour maximum) for high terrain areas. *Id.* A high terrain area was defined separately as any area having an elevation of 900 feet or more above the base of the facility's stack. CAA § 165(d)(2)(D)(iv), 42 U.S.C. § 7475(d)(2)(D)(iv) (2000). Low terrain area was defined as any area which was not a high terrain area. *Id.*

¹⁷⁰ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084 (Dec. 2, 1980). The proposed rules can be found at 44 Fed. Reg. 69,116 (1979) and 45 Fed. Reg. 34,762 (1980). Protection of Visibility, 44 Fed. Reg. 69,116 (1979); Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 34,762 (1980).

EPA decided to adopt a phased approach to visibility regulation.¹⁷¹ Phase I of the program included three elements.¹⁷² First, it required control of visibility impairment that could be traced to existing individual stationary sources or small groups of existing stationary sources.¹⁷³ Second, it required evaluation and control of new sources in order to prevent future visibility impairment.¹⁷⁴ Third, Phase I required states to adopt strategies to remedy existing impairment and prevent future impairment, such as control of existing non-major sources.¹⁷⁵ Future phases of the program would deal with what EPA referred to as the more complex problems of regional haze and urban plumes.¹⁷⁶

By the time it promulgated the 1980 regulations, EPA had already determined that visibility was an important value in 156 mandatory Class I areas.¹⁷⁷ These areas were located in thirty-six states, which were required to submit revisions to their SIPs within 9 months of promulgation of the regulations.¹⁷⁸ SIP revisions were required to include measures that assured reasonable progress toward achieving the national goals of remedying existing visibility impairment and preventing future impairment.¹⁷⁹ In addition, states were required to determine whether any existing facilities should install

¹⁷¹ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,085 (Dec. 2, 1980).

¹⁷² *Id.*

¹⁷³ *Id.*

¹⁷⁴ *Id.*

¹⁷⁵ *Id.*

¹⁷⁶ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,086 (Dec. 2, 1980).

¹⁷⁷ National Visibility Goal for Federal Class I Areas, Identification of Mandatory Class I Federal Areas Where Visibility is an Important Value, 44 Fed. Reg. 69,122 (Nov. 30, 1979).

¹⁷⁸ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,086 (Dec. 2, 1980).

¹⁷⁹ *Id.*

BART in order to control pollutants that impair visibility.¹⁸⁰ States were also required to implement long-term strategies for visibility protection, and adopt measures for their new source review programs relating to visibility impacts.¹⁸¹

The 1980 regulations emphasized the role of the Federal Land Manager in several respects.¹⁸² Significantly, the Federal Land Manager was given the authority to identify integral vistas within Class I areas.¹⁸³ Integral vista was defined as an important view from a point within the mandatory Class I area of a scene outside the boundary of the Class I area.¹⁸⁴ EPA specifically defined visibility in Class I areas to include integral vistas associated with those areas.¹⁸⁵ Federal Land Managers had until December 31, 1985, to identify any integral vista, in accordance with criteria developed by the Manager.¹⁸⁶ Once an integral vista was identified, the Federal Land Manager was required to notify the state, and the state had to identify it in its SIP.¹⁸⁷ If the Federal Land Manager did not identify the integral vista more than six months before SIP

¹⁸⁰ *Id.*

¹⁸¹ *Id.*

¹⁸² See generally Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,086, 80,088 80,091-80,093 (Dec. 2, 1980).

¹⁸³ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,086, 80,092 (Dec. 2, 1980) (codified at 40 C.F.R. § 51.304).

¹⁸⁴ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,086, 80,090 (Dec. 2, 1980) (codified at 40 C.F.R. § 51.301(n)).

¹⁸⁵ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,091 (Dec. 2, 1980) (codified at 40 C.F.R. § 51.301(y)).

¹⁸⁶ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,086, 80,092 (Dec. 2, 1980) (codified at 40 C.F.R. § 51.304(a)). Any criteria had to be preceded by reasonable notice and opportunity for public comment. *Id.* The criteria had to include, as a minimum, whether the integral vista was important to the visitor's visual experience of the mandatory Class I area. *Id.*

¹⁸⁷ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,086, 80,092 (Dec. 2, 1980) (codified at 40 C.F.R. §§ 51.304(b), (c)).

submission, the state could list the integral vista at the earliest opportunity, but no later than the next periodic review of the SIP.¹⁸⁸ The state could refuse to list the integral vista if it concluded that the Federal Land Manager did not identify the integral vista in accordance with the relevant criteria.¹⁸⁹ In such a situation, the state was required to consider the Federal Land Manager's expertise, and had to give the Manager the opportunity to consult with the Governor.¹⁹⁰

The 1980 regulations required the states to list integral vistas in their SIPs and consider the potential for new and existing sources to impair visibility in integral vistas.¹⁹¹ In addition, the Federal Land Manager could certify to the state at any time that visibility impairment existed in a Class I area.¹⁹² Such a certification would require the state to analyze whether BART would be appropriate for any existing facility that may contribute to visibility impairment in a mandatory Class I area or an integral vista.¹⁹³ The state itself could determine that visibility impairment existed in a Class I area.¹⁹⁴

When EPA promulgated the 1980 regulations, its description of the program indicated that either the state or the Federal Land Manager could trigger the BART

¹⁸⁸ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,086, 80,092 (Dec. 2, 1980) (codified at 40 C.F.R. § 51.304(c)).

¹⁸⁹ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,086, 80,092 (Dec. 2, 1980) (codified at 40 C.F.R. § 51.304(d)).

¹⁹⁰ *Id.*

¹⁹¹ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,086, 80,091-80,093 (Dec. 2, 1980) (codified at 40 C.F.R. §§ 51.302(c)(4)(i), 51.304, 51.307(b)(1)).

¹⁹² Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,086, 80,091 (Dec. 2, 1980) (codified at 40 C.F.R. § 51.302(c)(1)).

¹⁹³ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,086, 80,091 (Dec. 2, 1980) (codified at 40 C.F.R. §§ 51.302(c)(4)(i), 51.304).

¹⁹⁴ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,086, 80,091 (Dec. 2, 1980) (codified at 40 C.F.R. §§ 51.302(c)(2)(ii), 51.306(c)(7)).

requirement by identifying visibility impairment in mandatory Class I areas.¹⁹⁵ However, the text of the regulations indicated that only the Federal Land Manager could trigger BART.¹⁹⁶ More specifically, the final regulations required the SIP to include BART for existing facilities identified by the state after the Federal Land Manager certified that visibility impairment existed.¹⁹⁷ In other words, the state was not required to consider BART for existing facilities until after the Federal Land Manager acted.¹⁹⁸ Therefore, it was not clear at the time of the 1980 regulations that the state could trigger the BART requirement upon its own conclusion that visibility impairment existed in a mandatory Class I area.¹⁹⁹ Moreover, there was no provision for applying the BART requirement to non-mandatory Class I areas.²⁰⁰ In any event, the impairment had to be identified at least six months before submission of the SIP or SIP revision, in order to give the state enough time to develop a plan to remedy existing impairment.²⁰¹

Existing sources subjected to visibility regulation were defined as specified sources that had the potential to emit more than 250 tons per year of any pollutant and did

¹⁹⁵ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,086 (Dec. 2, 1980).

¹⁹⁶ See Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,091 (Dec. 2, 1980) (codified at 40 C.F.R. §§ 51.302(c)(2)(iii), 51.302(c)(4)).

¹⁹⁷ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,091 (Dec. 2, 1980) (codified at 40 C.F.R. §§ 51.302(c)(2)(iii), 51.302(c)(4)).

¹⁹⁸ *Id.*

¹⁹⁹ See *id.*

²⁰⁰ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,091 (Dec. 2, 1980) (codified at 40 C.F.R. § 51.302(c)(4)).

²⁰¹ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,086, 80,091 (Dec. 2, 1980) (codified at 40 C.F.R. § 51.302(c)(4)).

not begin operating until after August 7, 1962.²⁰² Sources reconstructed after that date also were considered existing sources.²⁰³ If a state determined that visibility impairment was reasonably attributable to an existing stationary source, that source was subject to a BART analysis.²⁰⁴ The BART analysis would identify the relevant pollutants and potential control technologies necessary to reduce existing visibility impairment.²⁰⁵ Any source identified for BART had to install and operate it as soon as practicable, but no later than five years after SIP approval.²⁰⁶ EPA anticipated that the relevant pollutants in any particular case during Phase I of the program would be particulate matter and NO_x.²⁰⁷ Since SO₂ emissions also contribute to regional haze, they would be addressed in Phase II of the program, but EPA did not expect any BART analyses for SO₂.²⁰⁸

The codified regulations did not specifically describe the BART analysis.²⁰⁹ Instead, BART was defined as an emission limitation based on the amount of reduction that could be achieved with the best system of continuous emission reduction for each

²⁰² Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,090 (Dec. 2, 1980) (codified at 40 C.F.R. § 51.301(e)). The final regulations listed 26 different types of facilities, including fossil-fuel fired steam electric plants exceeding 250 million British thermal units per hour heat input, pulp mills, cement plants, refinery operations, boilers, petroleum operations, smelting operations, and ore processing operations. *Id.*

²⁰³ *Id.*

²⁰⁴ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,086, 80,091 (Dec. 2, 1980) (codified at 40 C.F.R. § 51.302(c)(4)).

²⁰⁵ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,086 (Dec. 2, 1980).

²⁰⁶ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,092 (Dec. 2, 1980) (codifying 40 C.F.R. §§ 51.302(c)(4)(iv)).

²⁰⁷ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,087 (Dec. 2, 1980).

²⁰⁸ *Id.*

²⁰⁹ *See* Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,086, 80,091 (Dec. 2, 1980) (codifying 40 C.F.R. §§ 51.302, 51.303, 51.306).

pollutant emitted by an existing facility.²¹⁰ The limitation was to be determined on a case-by-case basis, considering available technology, costs of compliance, energy and non-air-quality environmental impacts, pollution control equipment already existing at the source, the remaining useful life of the source, and the improvement in visibility that was reasonably anticipated from the use of BART.²¹¹ If the state believed that the imposition of an emission standard was infeasible because measurement methods were too limited by technology or economics, it could impose alternative requirements on design, equipment, work practices or other operational aspects of the facility, with alternative emission standards.²¹² The remaining regulations required SIPs and the state's long-term strategy to provide for BART.²¹³ More specifically, SIPs were required to include emissions limitations representing BART and compliance schedules for facilities identified for BART.²¹⁴ The regulations specifically incorporated EPA's BART guidance for fossil-fuel fired electrical generation plants exceeding 750 megawatts in generating capacity.²¹⁵ State long-term strategies also were required to consider the need for BART and its effectiveness.²¹⁶

²¹⁰ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,087, 80,090 (Dec. 2, 1980) (codifying 40 C.F.R. § 51.301(c)).

²¹¹ *Id.*

²¹² Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,091 (Dec. 2, 1980) (codified at 40 C.F.R. § 51.302(c)(4)(ii)).

²¹³ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,086-80,087, 80,091-80,093 (Dec. 2, 1980) (codifying 40 C.F.R. §§ 51.302(c), 51.306(c)).

²¹⁴ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,086-80,087, 80,091 (Dec. 2, 1980) (codifying 40 C.F.R. § 51.302(c)).

²¹⁵ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,087, 80,091 (Dec. 2, 1980) (codifying 40 C.F.R. § 51.302(c)(4)(iii)).

²¹⁶ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,093 (Dec. 2, 1980) (codifying 40 C.F.R. § 51.306(c)).

Although the codified regulations did not describe the BART analysis, EPA provided a general outline of the analysis in its description of the visibility program.²¹⁷ When a source was identified as causing visibility impairment, the state would then identify the pollutants causing the impairment.²¹⁸ After identifying the relevant pollutants, the state would determine what control techniques could improve visibility.²¹⁹ If such a technique existed, then the state would “proceed[] with the BART analysis ...”²²⁰ However, if the most stringent control technique available would not result in an improvement in visibility, the state could end its analysis and was not required to impose any controls.²²¹ If control techniques were available, the state would study alternatives, considering costs and the other factors described above.²²² In this respect, EPA invited the states to consider its guidelines for coal-fired power plants, which were required when determining BART for power plants exceeding 750 megawatts in total generation capacity.²²³ The final stage of the BART analysis was for the state to set emissions limits that reflected BART.²²⁴ The source then would be required to install and operate the correct control technology.²²⁵

²¹⁷ See Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,086-80,087 (Dec. 2, 1980).

²¹⁸ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,087 (Dec. 2, 1980).

²¹⁹ *Id.*

²²⁰ *Id.*

²²¹ *Id.*

²²² *Id.*

²²³ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,087, 80,091 (Dec. 2, 1980) (codifying 40 C.F.R. § 51.302(c)(4)(iii)).

²²⁴ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,087 (Dec. 2, 1980).

²²⁵ *Id.*

If BART was not imposed on a particular facility as a result of a BART analysis, the state was required to repeat the analysis if new technology became available that was more effective at controlling the relevant pollutants.²²⁶ This repeat analysis only was required for the specific pollutants causing visibility impairment, if BART controls had not already been required, and if visibility impairment was reasonably attributable to emissions of the relevant pollutants.²²⁷

The 1980 regulations included exemptions from the BART requirement.²²⁸ A source could apply to EPA for an exemption if it could demonstrate that it did not by itself, or in combination with other sources, contribute to significant impairment of visibility in a mandatory Class I area.²²⁹ The state with regulatory authority over the source had to concur in the application, and the exemption could not be granted until the Federal Land Manager was notified and agreed.²³⁰ EPA considered visibility impairment to be significant when it interfered with a visitor's visual experience of the Class I area.²³¹

²²⁶ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,087, 80,092 (Dec. 2, 1980) (codifying 40 C.F.R. § 51.302(c)(4)(v)).

²²⁷ *Id.*

²²⁸ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,087, 80,092 (Dec. 2, 1980) (codifying 40 C.F.R. § 51.303).

²²⁹ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,087, 80,092 (Dec. 2, 1980) (codifying 40 C.F.R. § 51.303(a)(2)).

²³⁰ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,087, 80,092 (Dec. 2, 1980) (codifying 40 C.F.R. §§ 51.303(c), (d), (h)).

²³¹ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,087, 80,091 (Dec. 2, 1980) (codifying 40 C.F.R. § 51.301(v)). The definition specifically states that significant impairment is that which, in EPA's judgment, interferes with the management, protection, preservation, or enjoyment of the visitor's visual experience of the mandatory Class I area. *Id.* EPA's determination in this respect is made on a case-by-case basis, considering the geographic extent, intensity, duration, frequency, and time of the impairment, as well as how those factors related to the timing of visitor use and natural reductions in visibility. *Id.*

Thus, in making an application for exemption, sources had to address the frequency, extent and duration of the impairment.²³²

States also were required to develop monitoring strategies and include them in their SIPs.²³³ Such strategies could include visual observation or other appropriate techniques, and were required to take into account current and expected research on visibility monitoring, as well as EPA guidance and the availability of appropriate techniques.²³⁴ SIPs also were required to include mechanisms for considering and using visibility data in state decisions on BART determinations and new source review.²³⁵ With regard to new sources, states were encouraged to assess whether monitoring should be required on a case-by-case basis.²³⁶

States were required to develop long-term strategies designed to remedy existing visibility impairment and prevent future impairment for each mandatory Class I area.²³⁷ EPA believed ten to fifteen years was the appropriate time period for such strategies, with periodic review every three years.²³⁸ In order to remedy existing impairment, the states

²³² *Id.*

²³³ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,087, 80,092 (Dec. 2, 1980) (codifying 40 C.F.R. § 51.305(a)).

²³⁴ *Id.*

²³⁵ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,087, 80,092-80,093 (Dec. 2, 1980) (codifying 40 C.F.R. §§ 51.305(b), 51.307(d)).

²³⁶ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,087, 80,093 (Dec. 2, 1980) (codifying 40 C.F.R. § 51.307(d)).

²³⁷ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,087, 80,092 (Dec. 2, 1980) (codifying 40 C.F.R. §§ 51.306(a)(1), (2)).

²³⁸ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,087-80,088, 80,092 (Dec. 2, 1980) (codifying 40 C.F.R. §§ 51.306(a)(1), 51.306(c)).

were required to consider several measures at a minimum.²³⁹ One such measure was to modify or adopt land management plans that were protective of visibility in mandatory Class I areas.²⁴⁰ States were also required to consider the effectiveness of existing air pollution control programs, and whether sources not covered by BART should be subject to additional emissions limitations.²⁴¹ Retirement and replacement of existing sources were also options the states had to consider.²⁴²

With regard to preventing future impairment, SIP requirements were required to center on new source review regulations.²⁴³ Simply stated, states were required to review new major sources for their potential effect on visibility in Class I areas.²⁴⁴ This requirement applied regardless of whether the new source was located in a clean or nonattainment area.²⁴⁵ However, states could consider costs of compliance, time necessary for compliance, energy and non-air-quality environmental impacts, and the useful life of the source in their permitting decisions, unlike the normal review for new major sources.²⁴⁶

²³⁹ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,087, 80,093 (Dec. 2, 1980) (codifying 40 C.F.R. § 51.306(e)).

²⁴⁰ *Id.*

²⁴¹ *Id.*

²⁴² *Id.*

²⁴³ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,087, 80,093 (Dec. 2, 1980) (codifying 40 C.F.R. §§ 51.306(d), 51.307).

²⁴⁴ *Id.*

²⁴⁵ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,088, 80,093 (Dec. 2, 1980) (codifying 40 C.F.R. §§ 51.306(g), 51.307(a), 51.307(b)(2)).

²⁴⁶ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,088, 80,093 (Dec. 2, 1980) (codifying 40 C.F.R. §§ 51.306(g), 51.307(c)).

In addition, as the first part of their new source review process, states were required to notify all of the affected Federal Land Managers about any new major source or modification that could affect visibility in any Class I area.²⁴⁷ Notification was required within thirty days of the state's receipt of the permit application, and at least sixty days before public hearings on the application.²⁴⁸ The notification was required to include an analysis of the new source's anticipated impacts on visibility.²⁴⁹ After this notification, the state and the Federal Land Manager would enter into consultation, which would continue during the permit process.²⁵⁰

If the Federal Land Manager demonstrated that the source would adversely impact visibility within a Class I area, and the state agreed, EPA expected that the permit would be denied.²⁵¹ Such a denial was expected regardless of whether the PSD

²⁴⁷ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,088, 80,093 (Dec. 2, 1980) (codifying 40 C.F.R. § 51.307(a)(1)). EPA stated that notification should be provided when the state reasonably believes that an application is forthcoming for a source that would affect a Class I area. Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,088 (Dec. 2, 1980).

²⁴⁸ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,088, 80,093 (Dec. 2, 1980) (codifying 40 C.F.R. § 51.307(a)(1)). If the state received advance notification of a forthcoming permit application, it was required to notify the affected Federal Land Managers within thirty days of that advanced notification. Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,088, 80,093 (Dec. 2, 1980) (codifying 40 C.F.R. § 51.307(a)(2)).

²⁴⁹ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,093 (Dec. 2, 1980) (codifying 40 C.F.R. § 51.307(a)(1)).

²⁵⁰ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,088 (Dec. 2, 1980). Consultation was discussed only in EPA's explanation of the visibility rules. *Id.* The codified regulations did not specifically mention consultation, but instead were phrased in terms of the states and Federal Land Managers exchanging notifications and analyses. Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,093 (Dec. 2, 1980) (codifying 40 C.F.R. § 51.307(a)).

²⁵¹ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,088 (Dec. 2, 1980). The Federal Land Manager was required to provide his or her analysis within thirty days of receiving the state's notification that a permit application had been received or was forthcoming. Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,088, 80,093 (Dec. 2, 1980) (codifying 40 C.F.R. § 51.307(a)(2)).

increment had been violated.²⁵² EPA explained in its rulemaking that there might be situations where some visibility impairment could be accepted, if the state believed that the impairment would be temporary.²⁵³ EPA justified this idea by stating that permits could be conditioned on the addition of improved controls, and that reasonable progress could be attained over time despite temporary visibility impairment.²⁵⁴ In any event, if the state disagreed with the Federal Land Manager's opinion that visibility would be impaired in a Class I area, then it was required to provide a written explanation of its findings and make it publicly available before holding public hearings on the permit.²⁵⁵

The regulations also required an analysis of whether a new source would have visibility impacts on integral vistas.²⁵⁶ However, the integral vista had to have been identified by the Federal Land Manager at least twelve months before permit application, unless the Federal Land Manager provided for notice and public comment in the integral vista designation.²⁵⁷ If there was notice and an opportunity for public comment, the twelve-month minimum was reduced to six months.²⁵⁸ The states were not required to analyze impacts on integral vistas if they determined that such vistas were not identified

²⁵² Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,088 (Dec. 2, 1980).

²⁵³ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,095 (Dec. 2, 1980). EPA noted two examples of temporary impairment--during natural resource extraction and where there would be an opportunity in the future to remedy the impairment. *Id.*

²⁵⁴ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,095 (Dec. 2, 1980).

²⁵⁵ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,088, 80,093 (Dec. 2, 1980) (codifying 40 C.F.R. § 51.307(a)(3)). EPA made the Regional Administrator available to assist states when such disagreements arose. Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,088 (Dec. 2, 1980).

²⁵⁶ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,088, 80,093 (Dec. 2, 1980) (codifying 40 C.F.R. § 51.307(b)(1)).

²⁵⁷ *Id.*

²⁵⁸ *Id.*

in accordance with established identification criteria.²⁵⁹ In addressing whether additional controls would be necessary to minimize impacts on integral vistas, the states were allowed to consider costs of compliance, time necessary for compliance, energy and non-air-quality environmental impacts, and the useful life of the source.²⁶⁰ The states also were given the authority to require visibility monitoring at the site of the proposed facility or the area potentially affected by it.²⁶¹

V. Visibility Protection in the 90s

A. The Clean Air Act Amendments of 1990--Section 169B

The 1990 Amendments added section 169B, simply entitled "Visibility."²⁶² It required studies to determine sources and regions that cause visibility impairment and those that provide predominantly clean air to Class I areas.²⁶³ The research was to be based on expansion of visibility-related monitoring in class I areas, assessment of current sources of impairment and clean air corridors, adaptation of regional modes for visibility assessment, and the chemistry and physics of visibility.²⁶⁴ EPA was required to use this research to assess and evaluate sources and regions of sources that cause visibility

²⁵⁹ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,093 (Dec. 2, 1980) (codifying 40 C.F.R. § 51.307(b)(1)).

²⁶⁰ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,088, 80,093 (Dec. 2, 1980) (codifying 40 C.F.R. § 51.307(c)).

²⁶¹ Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,088, 80,093 (Dec. 2, 1980) (codifying 40 C.F.R. § 51.307(d)).

²⁶² Pub. L. No. 101-549, § 816, 104 Stat. 2399, 2695 (Nov. 15, 1990).

²⁶³ CAA § 169B(a)(1), 42 U.S.C. § 7492(a)(1) (2000).

²⁶⁴ CAA § 169B(a)(A-D), 42 U.S.C. § 7492(a)(A-D) (2000). Clean air corridors eventually were defined as regions that bring clear air to other regions. Regional Haze Regulations, Final Rule, 64 Fed. Reg. 35,714, 35,748 n.116 (July 1, 1999).

impairment or provide clean air to class I areas.²⁶⁵ EPA was also required to assess how visibility might be improved by implementation of the 1990 Amendments, other than section 169B.²⁶⁶ This assessment was required by November 15, 1992, with additional assessments of visibility improvements every five years.²⁶⁷

Section 169B authorized EPA to create visibility transport regions whenever it determined that current or projected transport of pollutants from one or more states contributed significantly to visibility impairment in Class I areas, or if petitioned by the Governors of at least two affected states, or upon a recommendation from a transport commission.²⁶⁸ Once created, EPA could modify the boundaries of a transport region on its own initiative, after being petitioned by the Governor of any affected state, or upon recommendation of a visibility transport commission.²⁶⁹ Modifications could include the addition or removal of any state or portion of a state.²⁷⁰

Whenever a transport region was created, EPA was required to establish a transport commission.²⁷¹ At minimum, a commission was required to include the Governor of each state in the transport region (or a designated representative), EPA (either the Administrator or a designated representative), and a representative of each

²⁶⁵ CAA § 169B(a)(2), 42 U.S.C. § 7492(a)(2) (2000). EPA had until November 15, 1993 to produce interim findings. *Id.*

²⁶⁶ CAA § 169B(b), 42 U.S.C. § 7492(b) (2000).

²⁶⁷ *Id.*

²⁶⁸ CAA §§ 169B(c), (c)(1), 42 U.S.C. §§ 7492(c), (c)(1) (2000). The term “affected state” is not defined, but the context indicates that an affected state is one in which air pollutants transported from other states are impairing visibility in a Class I area within its borders. *See* CAA § 169B(c)(1), 42 U.S.C. § 7492(c)(1) (2000).

²⁶⁹ CAA § 169B(c)(1), 42 U.S.C. § 7492(c)(1) (2000).

²⁷⁰ CAA § 169B(c)(1)(A-B), 42 U.S.C. § 7492(c)(1)(A-B) (2000).

Federal agency with direct management responsibility for any class I area within the transport region.²⁷² Any commission was required to assess existing data and studies relating to potential adverse impacts on visibility from projected growth in emissions from sources within the transport region.²⁷³ In addition, a commission was required to issue a report to EPA within four years of its establishment, recommending any measures necessary to remedy adverse impacts on visibility.²⁷⁴ Any such report was required, as a minimum, to address the establishment of clean air corridors requiring additional restrictions on emissions, imposition of nonattainment requirements on new stationary sources or major modifications to existing sources (including alternative siting analyses under section 173(a)(5)²⁷⁵), and the promulgation of regulations under section 169A addressing regional haze.²⁷⁶

Upon receiving a report from a transport commission, EPA was required within eighteen months to carry out its regulatory responsibilities under section 169A, including establishing or modifying criteria for measuring reasonable progress toward achieving the national goals of preventing and remedying visibility impairment.²⁷⁷ Any regulations

²⁷¹ CAA § 169B(c)(2), 42 U.S.C. § 7492(c)(2) (2000).

²⁷² CAA § 169B(c)(2)(A-C), 42 U.S.C. § 7492(c)(2)(A-C) (2000).

²⁷³ CAA § 169B(d)(1), 42 U.S.C. § 7492(d)(1) (2000).

²⁷⁴ CAA § 169B(d)(2), 42 U.S.C. § 7492(d)(2) (2000).

²⁷⁵ See CAA § 173(a)(5), 42 U.S.C. § 7503(a)(5) (2000).

²⁷⁶ CAA § 169B(d)(2)(A-C), 42 U.S.C. § 7492(d)(2)(A-C) (2000).

²⁷⁷ CAA § 169B(e)(1), 42 U.S.C. § 7492(e)(1) (2000); see CAA § 169A(a)(1), (4), 42 U.S.C. § 7492(a)(1), (4) (2000).

promulgated under this authority were required to direct the affected states to revise their SIPs accordingly within twelve months.²⁷⁸

B. The Grand Canyon Visibility Transport Commission (GCVTC)

In addition to the provisions relating to transport regions and commissions, the 1990 Amendments specifically required EPA to establish the GCVTC.²⁷⁹ The GCVTC published notice of its first meeting on November 13, 1991, and submitted its report to EPA in June 1996.²⁸⁰ It included the states of Arizona, California, Colorado, Idaho, Nevada, New Mexico, Oregon, Utah and Wyoming, as well as 211 tribal lands.²⁸¹ More specifically, the GCVTC was comprised of the Governors of the designated states (except for Idaho), and the leaders of the Navajo, Hopi, Hualapai, and Acoma Pueblo tribes.²⁸² *Ex officio* members included EPA, the federal land managers from the National Park Service, Bureau of Land Management, Fish and Wildlife Service, and the Columbia River Inter-Tribal Fish Commission.²⁸³

1. The GCVTC's Goals, Methods and Limitations

Congress expected the GCVTC to assess scientific, technical and other information relating to adverse visibility impacts from potential emissions increases

²⁷⁸ CAA § 169B(e)(2), 42 U.S.C. § 7492(e)(2) (2000).

²⁷⁹ CAA § 169B(f), 42 U.S.C. § 7492(f) (2000).

²⁸⁰ Grand Canyon Visibility Transport Commission, Notice of Meeting, 56 Fed. Reg. 57,522 (Nov. 13, 1991); REPORT OF THE GRAND CANYON VISIBILITY TRANSPORT COMMISSION TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (1996).

²⁸¹ REPORT OF THE GRAND CANYON VISIBILITY TRANSPORT COMMISSION TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY viii (1996).

²⁸² *Id.* at viii, 3.

²⁸³ *Id.*

within the Transport Region.²⁸⁴ It was tasked with reporting to EPA on what measures would be appropriate to address visibility on the Colorado Plateau.²⁸⁵ The Colorado Plateau was defined as a high-altitude, semi-arid tableland in southeast Utah, northern Arizona, northwest New Mexico, and western Colorado.²⁸⁶ It was noted for its unique erosion patterns, evidenced at several Class I areas, such as Grand Canyon, Zion, Bryce Canyon and Canyonlands.²⁸⁷ The report was required to address three areas.²⁸⁸ First, the GCVTC had to consider whether it would be appropriate to establish clean air corridors, and whether additional restriction may be necessary within such corridors.²⁸⁹ Second, the report had to address new requirements necessary for construction of new major sources or major modifications of existing sources within clean air corridors.²⁹⁰ Third, the

²⁸⁴ REPORT OF THE GRAND CANYON VISIBILITY TRANSPORT COMMISSION TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY 3 (1996); *see* CAA § 169B(d)(1), 42 U.S.C. § 7492(d)(1) (2000).

²⁸⁵ REPORT OF THE GRAND CANYON VISIBILITY TRANSPORT COMMISSION TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY 3 (1996); *see* CAA § 169B(d)(2), 42 U.S.C. § 7492(d)(2) (2000). The GCVTC worked largely through a Public Advisory Committee (PAC), as well as other committees. REPORT OF THE GRAND CANYON VISIBILITY TRANSPORT COMMISSION TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY 4 (1996). Each member of the GCVTC appointed up to five members to the PAC, resulting in broad public representation, "including government, business, industry, environmental organizations, academia and private citizens." *Id.* The PAC was charged with developing recommendations for the GCVTC, and providing a balanced perspective on the value and effects of visibility protection. *Id.* Simply stated, the GCVTC endeavored to perform its task with a foundation of public involvement and consensus. *Id.*

²⁸⁶ REPORT OF THE GRAND CANYON VISIBILITY TRANSPORT COMMISSION TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY vii (1996).

²⁸⁷ REPORT OF THE GRAND CANYON VISIBILITY TRANSPORT COMMISSION TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY vii, 1 (1996).

²⁸⁸ REPORT OF THE GRAND CANYON VISIBILITY TRANSPORT COMMISSION TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY 3 (1996); *see* CAA § 169B(d)(2), 42 U.S.C. § 7492(d)(2) (2000).

²⁸⁹ REPORT OF THE GRAND CANYON VISIBILITY TRANSPORT COMMISSION TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY 3 (1996); *see* CAA § 169B(d)(2)(A), 42 U.S.C. § 7492(d)(2)(A) (2000).

²⁹⁰ REPORT OF THE GRAND CANYON VISIBILITY TRANSPORT COMMISSION TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY 3 (1996); *see* CAA § 169B(d)(2)(B), 42 U.S.C. § 7492(d)(2)(B) (2000).

GCVTC had to consider potential regulations for addressing long-range strategies relating to regional haze in Class I areas on the Colorado Plateau.²⁹¹

The GCVTC conducted its work in six phases.²⁹² In the first phase, it developed an emissions inventory for the Transport Region.²⁹³ The inventory also included the neighboring states of Idaho, Montana, Washington, and Texas, as well as northern Mexico and Western Canada.²⁹⁴ 1990 was the base year, and the inventory included major sources in the Transport Region and county-level summaries of mobile and area sources.²⁹⁵ The gaseous pollutants covered were SO₂, NO_x and reactive organic gases.²⁹⁶ The aerosol pollutants covered were organic carbon, elemental carbon, fine particles and coarse particles.²⁹⁷

The GCVTC used the inventory to develop “emission management scenarios” and a method for assessing the impacts of those scenarios on cost and visibility.²⁹⁸ It approached emission management from three perspectives: “a regional emission cap; a visibility standard for the Colorado Plateau; and standardized control technology and

²⁹¹ REPORT OF THE GRAND CANYON VISIBILITY TRANSPORT COMMISSION TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY 3 (1996); *see* CAA § 169B(d)(2)(C), 42 U.S.C. § 7492(d)(2)(C) (2000).

²⁹² REPORT OF THE GRAND CANYON VISIBILITY TRANSPORT COMMISSION TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY 5 (1996).

²⁹³ *Id.*

²⁹⁴ *Id.*

²⁹⁵ *Id.*

²⁹⁶ *Id.* Reactive Organic Gases were defined as hydrocarbons, also including oxygenated hydrocarbons. *Id.* at xi.

²⁹⁷ *Id.* at 5.

²⁹⁸ *Id.*

process requirements.”²⁹⁹ The GCVTC used these approaches to develop scenarios, each including a baseline level, which projected the effects of existing law and regulation; an upper level, which considered maximum emissions controls, regardless of cost; and intermediate goals.³⁰⁰

The GCVTC defined its “Baseline Forecast Scenario” as “the best possible estimate of future visibility impairment at class I areas on the Colorado Plateau, assuming current law is enforced, with no additional actions to protect visibility.”³⁰¹ The Baseline Forecast Scenario considered annual averages and the averages of the best and worst twenty percent of days.³⁰² The GCVTC report predicted that by 2040, visibility impairment would be doubled on the worst days, caused mostly by human sources.³⁰³

The GCVTC broke new ground in developing its recommendations.³⁰⁴ It “needed a reliable picture of the impacts of regional haze visibility at sixteen Class I areas on the Colorado Plateau, and a way to assess ... changes in visibility and costs associated with

²⁹⁹ *Id.*

³⁰⁰ *Id.* at 5-6.

³⁰¹ *Id.* at 10. The Baseline Forecast Scenario was based on several assumptions: emissions growth or decline would be based on changes in economic demand in the region; sources would retire at a specific age; new sources would be mixtures of new technology and assumed control levels; State Implementation Plans projecting attainment by 2010 would be included, and after attainment, emissions growth would be permitted based on economic growth; unpaved road would not increase beyond 1990 levels; and emissions from Mexico would remain constant. *Id.* At the very least, current experience causes one to question the assumption that sources would retire at specific ages, given industry’s propensity for extending the lives of facilities in order to avoid pollution controls. *See generally*, ARNOLD W. REITZE, JR., AIR POLLUTION CONTROL LAW: COMPLIANCE & ENFORCEMENT §7-1 (forthcoming 2001).

³⁰² REPORT OF THE GRAND CANYON VISIBILITY TRANSPORT COMMISSION TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY 10 (1996).

³⁰³ *Id.* at 20.

³⁰⁴ *Id.* at 21.

... managing emissions.”³⁰⁵ The size and complex terrain of the Transport Region made the GCVTC’s job very difficult, as did data gaps, time, funding, and modeling technology.³⁰⁶ Its recommendations were based on findings made in the report.³⁰⁷ Notably, GCVTC found that current modeling showed improvements in visibility through the year 2000 under existing regulations.³⁰⁸ After that time, any gains in visibility would be offset by population increases and corresponding economic activity.³⁰⁹

The GCVTC also found that regional phenomena could contribute to visibility impairment.³¹⁰ In other words, long-range transport of emissions could cause haze in the Transport Region.³¹¹ This concept includes the transport of pollutants for more than 100 miles.³¹² In addition, the GCVTC found that there was a local aspect to haze on the Colorado Plateau, and that local sources (less than 100 miles away) may have greater impacts than previously thought.³¹³ In fact, the GCVTC concluded that emissions from local sources have a greater impact on visibility for each ton emitted than emissions from distant sources.³¹⁴ As an example, the report described a circumstance where local

³⁰⁵ *Id.*

³⁰⁶ *Id.*

³⁰⁷ *Id.* at 22.

³⁰⁸ *Id.*

³⁰⁹ *Id.*

³¹⁰ *Id.*

³¹¹ *Id.*

³¹² *Id.*

³¹³ *Id.*

³¹⁴ *Id.* at 23.

emissions could build up during periods when there is no wind.³¹⁵ Such emissions could become trapped above low-lying terrain during temperature inversions.³¹⁶ In addition, the GCVTC noted that Las Vegas and Salt Lake City could have significant impacts on visibility in Grand Canyon and Canyonlands, respectively.³¹⁷

The GCVTC also stressed the importance of wildfire and prescribed fire.³¹⁸ Forest fuels had been accumulating in the West because of land management practices, one of which was fire suppression.³¹⁹ Consequently, wildfires increased in size and destructive effects.³²⁰ At the time of the report, land managers were predicting increases in prescribed fire in order to minimize the effects of wildfire.³²¹ Episodic fire emissions are important contributors to aerosols that impair visibility, including organic carbon,

³¹⁵ *Id.* at 22.

³¹⁶ *Id.* An inversion occurs “when warm air moves over cooler air and acts as a lid to vertical dispersion” of air pollutants. ARNOLD W. REITZE, JR., AIR POLLUTION CONTROL LAW: COMPLIANCE & ENFORCEMENT §2-2 (forthcoming 2001). Inversions also occur when night cooling causes the air at ground level to become cooler than the air above. *Id.*

³¹⁷ REPORT OF THE GRAND CANYON VISIBILITY TRANSPORT COMMISSION TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY 22 (1996). The GCVTC specifically declined to define the term “significant,” stating that the term would be defined in the context of developing implementation plans, with the participation of affected parties. *Id.*

³¹⁸ *Id.* at 23. Prescribed fire was defined as fire in a wildland area that is allowed to burn under prescribed conditions that depend on ecosystem management goals, ability to control the fire, and air quality concerns. *Id.* at x. A prescribed natural fire is one started by a natural process, typically lightning, and allowed to burn under prescribed conditions. *Id.*

³¹⁹ *Id.* at 47.

³²⁰ *Id.*

³²¹ *Id.* at 23.

elemental carbon, and particulates.³²² As a result, the GCVTC anticipated that the effects of prescribed fire could occasionally exceed visibility improvements.³²³

In developing its recommendations, the GCVTC used a computer model called the Integrated Assessment System (IAS), which was designed to evaluate the visibility impacts and costs of different emission reduction strategies at any Class I area on the Colorado Plateau through 2040.³²⁴ It brought together most of the available scientific and technical information developed by the GCVTC.³²⁵

³²² *Id.* at 47. The GCVTC parenthetically identified the particulates as PM_{2.5}. *Id.* PM_{2.5} was separately defined as an aerosol with a diameter less than 2.5 micrometers—the most effective size range for creating haze. *Id.* at x.

³²³ *Id.* at 23.

³²⁴ *Id.* at viii, 5, 21.

³²⁵ *Id.* at 21. The GCVTC noted limitations in its data and modeling. *Id.* at 23-25. The majority of modeling was based on visibility at Hopi Point, in Grand Canyon National Park. *Id.* at 21. Furthermore, the IAS was designed primarily for analysis of regional transport, so it had limited utility for assessing the impacts of local sources, or for comparing local to regional sources. *Id.* at 23-24. However, the GCVTC was able to compare regional sources with each other. *Id.* at 24.

There were also a number of other limitations in the GCVTC's data. *Id.* at 24-25. First, most modeling was done with thirty-mile grid cells, and some major sources were analyzed using six-mile cells for part of the model year. *Id.* at 24. A cell is the geographic unit used in computer modeling of air quality. *Id.* at xi. Computer model designers use mathematical formulas, called transfer coefficients, to model how pollutants move from one cell to another. *Id.* The model did not reflect the actual physics of transport or dispersion of pollutants between cells. *Id.* at 24. Second, the model did not "simulate the effects [on pollutant transport] caused by 'smaller' terrain features such as the Grand Canyon." *Id.* This limitation was not discussed further. *Id.* Apparently, Grand Canyon qualifies as a "smaller" terrain feature because it is a general decrease in elevation relative to the surrounding area. *See id.* The model did, however, reliably simulate the effects of meteorological factors. REPORT OF THE GRAND CANYON VISIBILITY TRANSPORT COMMISSION TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY 24 (1996).

Third, the GCVTC noted that the visibility impacts projected by the model were scaled to reflect actual measurements. *Id.* As a result, inaccurate predictions of the effects of local sources would distort the effects of regional sources. *Id.* Fourth, the model did not project day-to-day variations in pollutant concentrations. *Id.* Instead, it projected such concentrations as seasonal or annual averages, considering twenty percent of the best and worst days. *Id.* The GCVTC noted the significance of this limitation, because visibility changes can occur within a matter of hours, much faster than the periods used in the model. *Id.* Fifth, although not quantified, uncertainties in the inventory, meteorology, modeling methods or background assumptions could have had significant effects on the model. *Id.*

The last important limitation noted in the report was the fact that pollution data was collected from only six receptors within the transport region, only four of which were used for modeling. *Id.* at 25. These four were Hopi Point, Mesa Verde, Canyonlands, and Bryce Canyon. *Id.* Of these four, the most detailed information came from Hopi Point (Grand Canyon). *Id.* Although the GCVTC has a "reliable understanding of visibility impacts at Hopi Point," the model did not lead to a thorough understanding of the rest of Grand Canyon or the remaining fifteen Class I areas on the Colorado Plateau. *Id.*

2. The GCVTC's Recommendations

The GCVTC based its recommendations on several guiding principles: achieve reasonable progress toward the national visibility goal; address all important sources of emissions; apply controls equitably; prevent future impairment by protecting clear days; remedy existing impairment by reducing present emissions; adopt a regional approach; assume existing federal, state and tribal laws will remain in force; consider costs and benefits of emissions control measures; develop action plans for all recommendations; provide funding; and consider social, cultural and environmental factors.³²⁶ The GCVTC's recommendations fell under eight categories: air pollution prevention; stationary sources; mobile sources; area sources; clean air corridors; emissions within and near Class I areas; emissions from Mexico; and future scientific and technical needs.³²⁷

The recommendations relating to air pollution prevention focused on energy conservation, low or zero emissions technologies, and incentive-based approaches to managing air quality.³²⁸ The GCVTC recognized that the population and economy of the West would continue to grow.³²⁹ As a result, the West would have an excellent opportunity to engage in energy conservation practices and use cleaner energy technologies, as well as renewable sources like solar and wind power.³³⁰ With regard to economic incentives, the GCVTC supported incentives that would encourage low or zero

³²⁶ *Id.* at 26-27.

³²⁷ *Id.* at 28-65.

³²⁸ *Id.* at 28-31.

³²⁹ *Id.* at 28.

³³⁰ *Id.* Other renewable sources noted in the report were biomass and geothermal resources. *Id.* at 30.

emission technologies, location of low-emission industries within the Transport Region, modifications of existing industries in order to reduce emissions and energy efficiency, development of renewable energy resources, and providing consumers with pollution prevention opportunities.³³¹

The GCVTC's specific recommendations relating to air pollution prevention were as follows:³³²

*Place a high priority on pollution prevention.*³³³

*Model the effects of renewable energy and pollution prevention.*³³⁴

*Develop economic incentives for pollution prevention efforts.*³³⁵

*Encourage zero and near-zero emitting technologies.*³³⁶

*Provide incentives for actions beyond compliance.*³³⁷

*Consider charging emission fees.*³³⁸

*Support development of renewable energy resources.*³³⁹

*Promote energy conservation.*³⁴⁰

*Promote education and public outreach efforts on preventing pollution.*³⁴¹

³³¹ *Id.* at 29.

³³² *Id.*

³³³ *Id.* at 25.

³³⁴ *Id.*

³³⁵ *Id.* at 29.

³³⁶ *Id.*

³³⁷ *Id.*

³³⁸ *Id.* at 30.

³³⁹ *Id.*

³⁴⁰ *Id.*

*Introduce product labeling.*³⁴²

*Promote the use of clean fuels.*³⁴³

(a) Pollution Prevention

Pollution prevention was stated as one of the GCVTC's highest priorities.³⁴⁴

However, the GCVTC was not able to quantitatively assess the visibility improvements or economic effects that might result.³⁴⁵ Of course, it expected visibility improvement to follow from the implementation of low or zero emitting technologies.³⁴⁶ The GCVTC also expected some economic impacts from economic incentives and emission fees.³⁴⁷

(b) Stationary Sources

With regard to stationary sources, the GCVTC focused on emissions of sulfates, but also addressed nitrates and organic compounds.³⁴⁸ SO₂ was considered the dominant precursor to sulfates.³⁴⁹ Since SO₂ could be attributed to a few large sources, the GCVTC concluded it was possible to forecast emissions trends with a fairly high degree of accuracy.³⁵⁰ The GCVTC's Baseline Forecast Scenario estimated a six percent

³⁴¹ *Id.* at 31.

³⁴² *Id.* The GCVTC described product labeling as a means of providing consumers "with information about the pollution potential, energy requirements and relative efficiency of products." *Id.*

³⁴³ *Id.*

³⁴⁴ *Id.* at 29.

³⁴⁵ *Id.* at 84.

³⁴⁶ *Id.* at 31.

³⁴⁷ *Id.*

³⁴⁸ *Id.* at 32.

³⁴⁹ *Id.*

³⁵⁰ *Id.*

reduction in SO₂ emissions through the year 2000 under existing regulations.³⁵¹ The GCVTC asserted that it would be possible to achieve greater reductions of twenty to thirty percent by the end of 2000, depending on the results of source attribution studies at several power plants, effects of emissions reductions in the copper smelting industry, and effects of low sulfur fuel standards.³⁵² Further, as with air pollution prevention, the GCVTC suggested an incentive-based trading program as a major part of its proposal.³⁵³

The GCVTC's specific recommendations relating to stationary sources were as follows:³⁵⁴

*Implement existing CAA requirements through the year 2000.*³⁵⁵

*Establish stationary source emission targets as regulatory triggers.*³⁵⁶ A trigger was defined as a firm limit on emissions with the same effect as a cap.³⁵⁷ However, a cap was specifically distinguished as a limit set under a regulatory program, triggered when emission targets are exceeded.³⁵⁸ The GCVTC proposed that an SO₂ emissions target would become effective in 2000, calculated by comparing actual reductions achieved

³⁵¹ *Id.*

³⁵² *Id.* "Source attribution" was defined as "[d]etermining how much a single source contributes to air pollution." *Id.* at xi.

³⁵³ *Id.* at 32-33.

³⁵⁴ *Id.* at 33-37.

³⁵⁵ *Id.* at 33-34. The GCVTC anticipated reductions from SO₂ control equipment under construction at the time of the report (specifically noting reductions at the Navajo Generating Station, near Page, Arizona). *Id.* at 33. Also, more reductions were expected from source attribution studies and decisions similar to BART within the Transport Region. *Id.*

³⁵⁶ *Id.* at 34.

³⁵⁷ *Id.*, fn. 4

³⁵⁸ *Id.*

before 2000 to the thirteen percent reduction projected by the Baseline Forecast Scenario.³⁵⁹ If the actual reduction was more than the projected reduction, the target would have been set midway between the two, unless the affected party convinced the GCVTC otherwise.³⁶⁰ The ultimate SO₂ emissions target for the Transport Region would be established for the year 2040 at fifty to seventy percent, as projected by the Baseline Forecast Scenario.³⁶¹ The GCVTC also recommended consideration of management options for NO_x and Particulate Matter.³⁶²

*Develop a plan for allocating trading credits under a regulatory program emissions cap.*³⁶³ The GCVTC recommended that several factors be considered in developing the trading program.³⁶⁴ First, the program should include measures to prevent new sources from causing emission targets to be exceeded.³⁶⁵ Second, the program would recognize sources that achieve reductions early or have achieved maximum controls.³⁶⁶ Third, it would ensure that all credit allocations would be of practical benefit.³⁶⁷ Finally, the program would recognize the effects of emissions changes on visibility.³⁶⁸

³⁵⁹ *Id.* at 34.

³⁶⁰ *Id.*

³⁶¹ *Id.*

³⁶² *Id.*

³⁶³ *Id.*

³⁶⁴ *Id.* at 35.

³⁶⁵ *Id.*

³⁶⁶ *Id.*

³⁶⁷ *Id.*

³⁶⁸ *Id.*

*Review compliance with targets and establish incentives.*³⁶⁹ Progress would be assessed in 2000 and every year thereafter.³⁷⁰ Sources would be rewarded for significant contributions to achieving necessary emission reductions.³⁷¹ If emissions targets were met, a new regulatory program would not be necessary.³⁷² Conversely, if targets were exceeded, a new regulatory program would be implemented, most likely including an emissions cap and market trading program.³⁷³

*Complete source attribution studies.*³⁷⁴

*Develop an improved monitoring and accounting system.*³⁷⁵ The GCVTC noted that a major deficiency in its analysis was a lack of adequate and reliable monitoring data.³⁷⁶ Of course, an accurate baseline assessment of existing conditions would be necessary in order to measure progress under the program.³⁷⁷ For example, modeling needed to be based on more data than just that which is collected from Hopi Point.³⁷⁸ In

³⁶⁹ *Id.*

³⁷⁰ *Id.*

³⁷¹ *Id.* Rewards might include exemptions from interim target requirements, streamlined permitting, emissions banking, or bonus allowances if credits are used to achieve development on tribal lands or other relatively undeveloped areas. *Id.* at 35-36.

³⁷² *Id.* at 35.

³⁷³ *Id.* at 36.

³⁷⁴ *Id.* The GCVTC encouraged EPA to complete within one year the source attribution study which was ongoing at the Mohave Generating Station. *Id.*

³⁷⁵ *Id.*

³⁷⁶ *Id.*

³⁷⁷ *Id.*

³⁷⁸ *Id.*

addition, accounting for emissions within the Transport Region would have to be improved.³⁷⁹

The GCVTC noted that no additional costs should be incurred by its recommendations relating to stationary sources, because they were based on requirements contained in regulations in existence at the time of the report.³⁸⁰ However, if the recommended targets were not met, more rigorous requirements would need to be imposed.³⁸¹ Again, the GCVTC emphasized the value of a market trading program as the most cost-effective approach to dealing with regional haze.³⁸² The GCVTC expected similar emission reductions if other pollutants were included in the program, with additional costs incurred only for monitoring and assessment.³⁸³

(c) Mobile Sources

With regard to mobile sources, the GCVTC's approach was very broad, including recommendations for mobile sources in general, as well as recommendations for national, regional and local strategies.³⁸⁴ The GCVTC recognized that emissions from automobiles manufactured today are substantially lower than those manufactured in the 1960s.³⁸⁵ However, emissions from many mobile sources, such as light- and heavy-duty vehicles, watercraft, trains, and airplanes, all contribute to visibility impairment on the

³⁷⁹ *Id.*

³⁸⁰ *Id.* at 84.

³⁸¹ *Id.*

³⁸² *Id.*

³⁸³ *Id.*

³⁸⁴ *Id.* at 38-45.

³⁸⁵ *Id.* at 38.

Colorado Plateau.³⁸⁶ Also, the GCVTC found that direct emissions and road dust from motor vehicles contributed significantly to urban plumes transported across the Plateau.³⁸⁷ In addition, the number of vehicles and vehicle miles traveled had increased significantly over the years.³⁸⁸ Moreover, emissions from interstate and cross-border truck traffic, delivery and transportation vehicles all were found to contribute significantly to total emissions, despite reductions in emissions from heavy-duty diesel engines.³⁸⁹ Therefore, the GCVTC concluded that reducing total mobile source emissions was essential to visibility protection in the long term.³⁹⁰

The GCVTC's general recommendations relating mobile sources were as follows:³⁹¹

*Adopt an emissions management objective and establish a regional emissions budget.*³⁹²

*Develop a system for tracking emissions.*³⁹³

*Suggest targeted local actions.*³⁹⁴ Such actions were considered necessary to reduce mobile source emissions within Class I areas on the Colorado Plateau, in adjacent communities, and in major urban areas that significantly affect visibility.³⁹⁵

³⁸⁶ *Id.*

³⁸⁷ *Id.*

³⁸⁸ *Id.* Vehicle Miles Traveled was defined as a measure of vehicle use, applied in calculations of air pollution produced by mobile sources, such as motor vehicles or road dust. *Id.* at xii.

³⁸⁹ *Id.* at 38.

³⁹⁰ *Id.*

³⁹¹ *Id.* at 38-39.

³⁹² *Id.* at 38.

With regard to national strategies, the GCVTC recognized that it would be difficult to justify a national strategy based solely on impacts to the Colorado Plateau.³⁹⁶ However, the GCVTC noted that there were “numerous” initiatives and proposals relating to urban ozone that could benefit air quality in Class I areas on the Colorado Plateau.³⁹⁷ The GCVTC recommended that EPA’s efforts be consistent with the GCVTC’s.³⁹⁸

The GCVTC took a favorable view of several national initiatives.³⁹⁹ It supported the Low Emission Vehicle standards and federal Tier 2 vehicle emission standards, which were to begin in 2001 and 2004, respectively.⁴⁰⁰ In the long term (out to 2040), the GCVTC supported the development of ultra-low and zero-emission vehicles.⁴⁰¹ It also supported standards for heavy-duty and off-road vehicles.⁴⁰² The GCVTC specifically requested that EPA pursue additional and broader reductions in the sulfur content of both gasoline and diesel, promotion of cleaner burning fuels, and standards for locomotives,

³⁹³ *Id.* at 39.

³⁹⁴ *Id.*

³⁹⁵ *Id.*

³⁹⁶ *Id.*

³⁹⁷ *Id.*

³⁹⁸ *Id.*

³⁹⁹ *Id.* at 39-41.

⁴⁰⁰ *Id.* at 39-40. At the time, the California Air Resources Board had agreed with the largest automobile manufacturers to sell nationwide only cars and light trucks that met California’s Low Emission Vehicle standards, beginning in 2001. *Id.* at 39 n.8.

⁴⁰¹ *Id.* at 40.

⁴⁰² *Id.* At the time, EPA had proposed to reduce NO_x and particulate emissions from new, on-road, heavy-duty vehicles by at least fifty percent. *Id.* n.9. Heavy duty engine manufacturers, EPA, and the California Air Resources Board had agreed in principle to introduce a NO_x standard of two grams per brake-horsepower hour by 2004. *Id.*

watercraft, airplanes and federal vehicles.⁴⁰³ Finally, the GCVTC supported improvements in control of evaporative emissions with vapor recovery systems.⁴⁰⁴

The GCVTC's recommended regional strategies included clean fuel demonstration zones, pricing and incentive approaches, inspection programs for heavy-duty vehicles, and promotion of vehicle maintenance.⁴⁰⁵ Clean fuel demonstration zones involved zones or corridors with infrastructure for alternative fuels.⁴⁰⁶ The GCVTC encouraged such an approach for heavy-duty trucks, buses, urban areas and major trucking routes.⁴⁰⁷ At a minimum, the GCVTC recommended establishing incentives for converting vehicles used for mass transportation to alternative fuels, anticipating that such vehicles would be used within National Parks on the Colorado Plateau, as well as in nearby urban areas.⁴⁰⁸ The idea behind pricing and incentive approaches was to study the extent to which alternative transportation options could be developed in order to reduce reliance on motor vehicles.⁴⁰⁹ Inspection of heavy-duty vehicles and promotion of vehicle maintenance were, of course, designed to limit vehicle emissions.⁴¹⁰ With regard to inspection of heavy-duty vehicles, the GCVTC proposed to target vehicles that

⁴⁰³ *Id.* at 40.

⁴⁰⁴ *Id.* at 41.

⁴⁰⁵ *Id.* at 41-42.

⁴⁰⁶ *Id.* at 41. The GCVTC noted that, at the time, efforts were under way to establish various alternative fuel stations along Interstate 15 between Salt Lake City and St. George, Utah, and along Interstates 15, 5, and 8 between Salt Lake City, Los Angeles, California and Sacramento, California. *Id.* n.10.

⁴⁰⁷ *Id.* at 41.

⁴⁰⁸ *Id.*

⁴⁰⁹ *Id.* at 42.

⁴¹⁰ *Id.*

routinely use highways within the Transport Region.⁴¹¹ However, the GCVTC recognized the interstate commerce issues raised by such programs.⁴¹²

The GCVTC asserted that decisions on achieving emissions objectives would best be made at the local or metropolitan level.⁴¹³ At the same time, it recognized that some areas had disproportionate impacts on Class I areas in the Colorado Plateau.⁴¹⁴ As a result, the GCVTC emphasized that major metropolitan areas near the Plateau would have to be encouraged to reduce vehicle emissions.⁴¹⁵ In this regard, the GCVTC recommended several programs.⁴¹⁶ Not surprisingly, economic incentives were among the programs suggested, including fiscal incentives to reward communities able to reduce reliance on single-occupancy vehicles.⁴¹⁷

The GCVTC also encouraged sustainable development to avoid incremental degradation of visibility as the West continued to grow.⁴¹⁸ Concepts of sustainable development included multi-modal transportation, fostering competition in the transit industry, integrating land use planning with transportation systems, and programs for sharing information among communities.⁴¹⁹ The GCVTC also recommended mobile source emissions budgets for selected major urban areas, to the extent such areas

⁴¹¹ *Id.*

⁴¹² *Id.*

⁴¹³ *Id.*

⁴¹⁴ *Id.* at 42-43.

⁴¹⁵ *Id.* at 43.

⁴¹⁶ *Id.* at 43-45.

⁴¹⁷ *Id.* at 43.

⁴¹⁸ *Id.*

contributed significantly to visibility impairment in Class I areas on the Colorado Plateau.⁴²⁰ The GCVTC further suggested that local authorities consider retiring higher emitting vehicles, and develop incentives for citizens to upgrade their vehicles.⁴²¹

In analyzing its mobile source recommendations, the GCVTC noted that its model appeared to underestimate urban effects on visibility.⁴²² Since mobile sources were considered a significant part of urban emissions, it was likely that the model did not adequately predict the impact of mobile sources on visibility.⁴²³ At the time of the report, modeling showed that about thirty percent of the annual light extinction caused by human sources at Hopi Point was caused by mobile sources.⁴²⁴ This equated to about 3.5 inverse megameters (Mm^{-1}).⁴²⁵ 2.5 of those were attributed to road dust, and the remainder to tailpipe emissions.⁴²⁶ Although the Low Emission Vehicle was likely to reduce NO_x and volatile organic compound emissions by thirty percent, this reduction only would have resulted in small visibility improvements over the course of a year, measured at Hopi Point.⁴²⁷ However, the GCVTC noted that the model may have underestimated this

⁴¹⁹ *Id.*

⁴²⁰ *Id.* at 44.

⁴²¹ *Id.* at 45.

⁴²² *Id.* at 85.

⁴²³ *Id.*

⁴²⁴ *Id.* In this context, "mobile sources" included roads, on-road vehicles, off-road vehicles, aviation, watercraft and trains. *Id.*

⁴²⁵ *Id.*

⁴²⁶ *Id.*

⁴²⁷ *Id.*

potential improvement, and it had not modeled the effects of its proposed regional and local programs on visibility.⁴²⁸

(d) Area Sources

With regard to area sources, the GCVTC addressed dust from paved and unpaved roads, and fire.⁴²⁹ The most recent modeling at the time indicated that local sources of road dust had more significant impact on visibility than distant sources.⁴³⁰ Previous modeling had linked projections to increases in population and vehicle miles traveled.⁴³¹ However, the GCVTC noted that the effects of road dust were actually more localized, especially the effects of larger particulates that settle very close to roads.⁴³² Given the uncertainty involved, the GCVTC recommended further study, but continued to support voluntary efforts in local communities within and near Class I areas.⁴³³

With regard to fire, the GCVTC understood that land managers were predicting increases in prescribed fire in order to minimize the effects of wildfire.⁴³⁴ Also, at the time of the report, the effects of agricultural burning had not been quantified, because of a lack of data.⁴³⁵ However, the GCVTC asserted that all types of fire would have to be addressed as part of a visibility protection program, particularly prescribed fire and

⁴²⁸ *Id.*

⁴²⁹ *Id.* at 46-47.

⁴³⁰ *Id.* at 46.

⁴³¹ *Id.*

⁴³² *Id.*

⁴³³ *Id.*

⁴³⁴ *Id.* at 23.

⁴³⁵ *Id.* at 47.

agricultural burning.⁴³⁶ The primary management alternative for fire discussed in the report was prescribed fire, which is designed to reduce excessive fuel loads, reduce the intensity of wildfires, and help restore the existence of fire to its natural role in the environment.⁴³⁷ The report noted that land managers used emission reduction and smoke management techniques in order to reduce air quality impacts, specifically through the timing and location of burns.⁴³⁸ However, the GCVTC asserted that these techniques could be expanded.⁴³⁹ In addition, prescribed fire may be necessary even where mechanical techniques are used to remove forest fuels, such as logging or firewood sales.⁴⁴⁰

The GCVTC's specific recommendations regarding fire were as follows:⁴⁴¹

*Plan for the visibility impacts of smoke.*⁴⁴²

*Implement an emissions tracking system for prescribed fire, wildfire and agricultural burning.*⁴⁴³

Improve integrated assessment of emissions by identifying areas where fire could have adverse visibility impacts, identifying areas for mechanical treatments,

⁴³⁶ *Id.*

⁴³⁷ *Id.*

⁴³⁸ *Id.* at 48.

⁴³⁹ *Id.*

⁴⁴⁰ *Id.*

⁴⁴¹ *Id.* at 48-50.

⁴⁴² *Id.* at 48.

⁴⁴³ *Id.*

*considering alternatives to burning, and assessing what information is needed for modeling.*⁴⁴⁴

*Enhance smoke management programs.*⁴⁴⁵

*Develop cooperative funding mechanisms between burners and regulators in order to implement enhanced smoke management programs.*⁴⁴⁶

*Promote public education programs relating to the role of fire in air quality.*⁴⁴⁷

*Establish annual emission goals for fire programs by the year 2000 designed to minimize increases in fire emissions.*⁴⁴⁸

*Remove administrative barriers to using alternatives to burning to the maximum extent feasible.*⁴⁴⁹

The GCVTC's models indicated that emissions from prescribed fires and wildfires are likely to have the greatest impact on visibility in Class I areas through the year 2040.⁴⁵⁰ In fact, the models indicated that visibility impairment from fires may, at times, offset visibility improvements.⁴⁵¹ In addition, the GCVTC noted that most wildfires occur in the summer and fall, and prescribed is generally done in the spring,

⁴⁴⁴ *Id.* at 48-49.

⁴⁴⁵ *Id.* at 49.

⁴⁴⁶ *Id.*

⁴⁴⁷ *Id.* at 49-50.

⁴⁴⁸ *Id.* at 50.

⁴⁴⁹ *Id.*

⁴⁵⁰ *Id.* at 85.

⁴⁵¹ *Id.*

summer and fall.⁴⁵² Since the clearest days on the Colorado Plateau are during winter, fire emissions will further degrade the worst visibility days.⁴⁵³ By the year 2040, the GCVTC projected that visibility impairment caused by prescribed fire could increase by 400 percent.⁴⁵⁴

(e) Clean Air Corridors

In the course of its work, the GCVTC found that clean air corridors exist in the West.⁴⁵⁵ A clean air corridor was described as a source of clean air for Class I areas.⁴⁵⁶ One such source studied by the GCVTC was said to cover parts of Nevada, southern Utah, eastern Oregon and southwestern Idaho, and believed to provide clean air to Grand Canyon.⁴⁵⁷ Although growth in this area was not expected to have a perceptible effect on visibility, the GCVTC recognized that other corridors might influence visibility on the Plateau.⁴⁵⁸ At the time of the report, the relationships between such corridors and Class I sites had not been fully established, so further study was necessary.⁴⁵⁹ As a result, the GCVTC did not recommend any special programs in this regard.⁴⁶⁰ However, it

⁴⁵² *Id.* at 86.

⁴⁵³ *Id.*

⁴⁵⁴ *Id.* at 87.

⁴⁵⁵ *Id.* at 51.

⁴⁵⁶ *Id.* at ii; *see* Regional Haze Regulations, Final Rule, 64 Fed. Reg. 35,714, 35,748 n.116 (July 1, 1999) (defining clean air corridors as regions that generally bring clear air to a receptor region).

⁴⁵⁷ REPORT OF THE GRAND CANYON VISIBILITY TRANSPORT COMMISSION TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY 51 (1996).

⁴⁵⁸ *Id.*

⁴⁵⁹ *Id.*

⁴⁶⁰ *Id.*

encouraged regional tracking and monitoring within and near areas that were sources of clean air for Class I sites on the Plateau.⁴⁶¹

(f) Emissions Within and Near Class I Areas

The GCVTC also made separate recommendations relating to emissions within and near Class I areas.⁴⁶² In particular, the GCVTC was concerned with transportation-related emissions and emissions from energy use, as well as prescribed fire.⁴⁶³ In the GCVTC's opinion, federal land management plans were the appropriate means for addressing at least some contributors to visibility impairment.⁴⁶⁴ Generally, the GCVTC encouraged federal land managers to limit and reduce visibility impairing emissions within Class I areas through their respective planning process.⁴⁶⁵ Also, it recommended that federal land managers pursue strategies for nearby communities, such as participating in external planning processes, reviewing permit applications for new or modified stationary sources, and requesting emissions reduction strategies from appropriate regulatory authorities.⁴⁶⁶

In the GCVTC's opinion, emissions of particles deserved special attention because fine soil particles from sources near and distant from Class I areas caused about

⁴⁶¹ *Id.* at 52.

⁴⁶² *Id.* at 53-55.

⁴⁶³ *Id.* at 53.

⁴⁶⁴ *Id.* Noted examples were National Park Service programs implementing in-park, low-emission transportation systems, conversion of park vehicles to alternative fuels, and increasing energy efficiency. *Id.*

⁴⁶⁵ *Id.* at 53-54.

⁴⁶⁶ *Id.* at 54.

one-third of the total visibility impairment caused by particles.⁴⁶⁷ About two-thirds of the particles measured at Hopi Point consisted of fine soil particles and coarse material (PM_{2.5} and PM₁₀, respectively).⁴⁶⁸ Since coarse material does not travel as far as fine particles, the GCVTC concluded that sources of coarse material within and near Class I areas were likely to be more significant to visibility than regional sources.⁴⁶⁹

(g) Transboundary Emissions from Mexico

With regard to transboundary emissions from Mexico, the GCVTC recognized that it lacked authority to address them directly, but supported efforts to develop inventories, establish institutions and agreements between the U.S. and Mexico, and incentives for air pollution abatement.⁴⁷⁰ The GCVTC also recommended the development of planning mechanisms for communities near the border that suffer the most severe effects.⁴⁷¹ As for economic incentives, the GCVTC encouraged EPA to explore emission reduction credits for U.S. industries investing in pollution control projects in Mexico.⁴⁷² The GCVTC also discussed disincentives for U.S. investment in facilities in Mexico that do not have adequate pollution controls.⁴⁷³

⁴⁶⁷ *Id.* at 88.

⁴⁶⁸ *Id.* at 87.

⁴⁶⁹ *Id.* at 88.

⁴⁷⁰ *Id.* at 56.

⁴⁷¹ *Id.* at 57.

⁴⁷² *Id.*

⁴⁷³ *Id.*

The GCVTC found that most transboundary emissions were sulfur oxides (SO_x), and most of those emissions come from area sources within Mexico.⁴⁷⁴ The estimated impact on visibility at Hopi Point was 1.68 Mm⁻¹, amounting to about seventeen percent of “manageable visibility impairment” at Hopi Point.⁴⁷⁵ On the whole, the GCVTC concluded that more work was necessary on the emissions inventory before it could quantify the potential benefits from its recommendations.⁴⁷⁶

(h) The Need for Additional Research and Technology

Many of the recommendations made by the GCVTC called for additional scientific or technical efforts in order to develop future programs.⁴⁷⁷ For example, the recommendations relating to stationary sources called for improved emissions monitoring and accounting.⁴⁷⁸ Other recommendations called for improved modeling, additional data collection, and improved inventories.⁴⁷⁹ The GCVTC proposed four types of initiatives “to meet the technical needs of future programs: improved emissions inventories, expanded monitoring of visual air quality, refined modeling capacities, and improved assessment information and methods.”⁴⁸⁰ Emissions inventories needed to be

⁴⁷⁴ *Id.* at 88.

⁴⁷⁵ *Id.* The GCVTC noted that emissions “manageable” within the U.S. may not be “manageable” in Mexico. *Id.* The GCVTC estimated that about 1 Mm⁻¹ was caused by industrial and residential sources near the Mexico border, about .34 Mm⁻¹ was caused by specific stationary sources, and about .34 Mm⁻¹ was caused by off-shore shipping emissions that are transported across Mexico into the U.S. *Id.* These estimates were done on an annual average basis. *Id.* Since meteorological conditions limit the effects of those emissions to about twenty-five percent of the year, the resulting visibility impairment at Hopi Point on some days is probably much greater. *Id.*

⁴⁷⁶ *Id.*

⁴⁷⁷ *Id.* at 59.

⁴⁷⁸ *Id.*

⁴⁷⁹ *Id.*

⁴⁸⁰ *Id.*

updated continuously in order to reflect actual emissions in the region.⁴⁸¹ This was expected to be particularly important if an effective trading program were to be implemented.⁴⁸² In addition, visibility monitoring needed to be expanded, since it had been done only at six of the sixteen Class I sites on the Colorado Plateau.⁴⁸³ As of the time of the report, visibility had only been inferred for the vast majority of the region.⁴⁸⁴ Finally, the modeling methods needed improvement in order to more accurately predict emissions from various sources and their effects under a variety of conditions.⁴⁸⁵

C. The 1997 Proposed Regional Haze Regulations

EPA issued proposed regional haze regulations on July 31, 1997, based generally on the GCVTC report.⁴⁸⁶ In the proposed regulations, EPA focused on developing a long-term strategy, which would be adopted by affected states in order to reduce regional haze in mandatory Class I areas.⁴⁸⁷ Visibility impairment caused by specific sources or small groups of sources would remain subject to existing visibility regulations.⁴⁸⁸ EPA

⁴⁸¹ *Id.* at 60.

⁴⁸² *Id.*

⁴⁸³ *Id.*

⁴⁸⁴ *Id.*

⁴⁸⁵ *Id.* at 61.

⁴⁸⁶ Regional Haze Regulations, Notice of Proposed Rulemaking, 62 Fed. Reg. 41,138 (July 31, 1997); ARNOLD W. REITZE, JR., AIR POLLUTION CONTROL LAW: COMPLIANCE & ENFORCEMENT § 5-3(d) (forthcoming 2001).

⁴⁸⁷ Regional Haze Regulations, Notice of Proposed Rulemaking, 62 Fed. Reg. 41,138, 41,143 (July 31, 1997); ARNOLD W. REITZE, JR., AIR POLLUTION CONTROL LAW: COMPLIANCE & ENFORCEMENT § 5-3(d) (forthcoming 2001).

⁴⁸⁸ Regional Haze Regulations, Notice of Proposed Rulemaking, 62 Fed. Reg. 41,138, 41,143, 41,145 (July 31, 1997).

referred to this type of visibility impairment as “reasonably attributable” impairment, in order to differentiate it from regional haze visibility impairment.⁴⁸⁹

The regulations proposed to expand the applicability of the regional haze program to all states, the District of Columbia, and the Virgin Islands.⁴⁹⁰ Up until that time, the reasonably attributable regulations only applied to the thirty-six states containing mandatory Class I areas.⁴⁹¹ Hawaii, Alaska and the Virgin Islands were proposed for inclusion in the program because emissions from sources within their borders potentially could have contributed to visibility impairment in mandatory Class I areas located within their borders.⁴⁹² Puerto Rico, Guam, American Samoa and the Northern Mariana Islands were not to be included in the program because of their distance from any mandatory Class I areas.⁴⁹³

The proposed rule created a new measurement for visibility, called a “deciview.”⁴⁹⁴ A deciview is “an atmospheric haze index that expresses uniform changes in haziness in terms of common increments across the entire range of conditions, from pristine to extremely impaired environments.”⁴⁹⁵ In other words, it is a means of

⁴⁸⁹ Regional Haze Regulations, Notice of Proposed Rulemaking, 62 Fed. Reg. 41,138, 41,139, 41,143 (July 31, 1997).

⁴⁹⁰ Regional Haze Regulations, Notice of Proposed Rulemaking, 62 Fed. Reg. 41,138, 41,143- 41,144 (July 31, 1997).

⁴⁹¹ See Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,089-80,090 (1980) (codifying at 40 C.F.R. § 51.300).

⁴⁹² Regional Haze Regulations, Notice of Proposed Rulemaking, 62 Fed. Reg. 41,138, 41,144 (July 31, 1997). However, Alaska, Hawaii and the Virgin Islands were not expected to engage in regional planning activities. *Id.*

⁴⁹³ *Id.*

⁴⁹⁴ *Id.* at 41,145.

⁴⁹⁵ *Id.*

expressing light extinction.⁴⁹⁶ A change of one deciview is a small but noticeable change in haziness under most circumstances.⁴⁹⁷ Deciview levels can be calculated from ambient PM_{2.5} and PM₁₀ data, assuming specific light extinction values for the relevant particles present in the air, such as sulfates, nitrates, and carbon.⁴⁹⁸

According to EPA, the advantage of using the deciview was that it could “express changes in visibility impairment linearly with human perception.”⁴⁹⁹ This was believed to be better than measuring visual range, because the significance of a change in visual range depends on the level of impairment that exists in the area.⁵⁰⁰ For example, when visibility is only ten miles, a five-mile reduction in visual range appears significant to the observer, whereas the difference between 100 and ninety-five miles does not.⁵⁰¹

The proposed regulations also included a presumptive target for reasonable progress.⁵⁰² The target was intended to provide for progress toward the national visibility goal by creating perceptible improvements on the worst days (most impaired), and preventing degradation on the best days (least impaired).⁵⁰³ The target had two elements.⁵⁰⁴ First, for the most impaired days, the target was a rate of improvement of

⁴⁹⁶ *Id.*

⁴⁹⁷ *Id.*

⁴⁹⁸ *Id.*

⁴⁹⁹ *Id.*

⁵⁰⁰ *See id.*

⁵⁰¹ Regional Haze Regulations, Notice of Proposed Rulemaking, 62 Fed. Reg. 41,138, 41,145 (July 31, 1997).

⁵⁰² Regional Haze Regulations, Notice of Proposed Rulemaking, 62 Fed. Reg. 41,138, 41,145-41,146 (July 31, 1997).

⁵⁰³ *Id.*

⁵⁰⁴ *Id.* at 41,146.

one deciview over a ten or fifteen year period.⁵⁰⁵ Second, no increase of deciview was allowed for the least impaired days, as compared to baseline conditions.⁵⁰⁶

EPA articulated three reasons for a time period of ten to fifteen years.⁵⁰⁷ First, the longer time period allows for better trend analysis, in light of yearly changes in weather, transport patterns, and natural emissions of particulates.⁵⁰⁸ Second, such a time period was consistent with section 169A's requirement for states to develop long-term strategies of ten to fifteen years in duration.⁵⁰⁹ Third, the time period was consistent with the GCVTC's definition of reasonable progress, which included steady improvement over time.⁵¹⁰ The proposed rule required states to demonstrate reasonable progress every three years.⁵¹¹

States would also be required periodically to revise their SIPs.⁵¹² The proposed rule required initial SIP revisions within twelve months of promulgation of the final rule.⁵¹³ The next revision was required four years later, with subsequent revisions every

⁵⁰⁵ *Id.*

⁵⁰⁶ *Id.*

⁵⁰⁷ *Id.*

⁵⁰⁸ *Id.*

⁵⁰⁹ *Id.*; see CAA § 169A(b)(2)(B), 42 U.S.C. § 7491(b)(2)(B) (2000).

⁵¹⁰ Regional Haze Regulations, Notice of Proposed Rulemaking, 62 Fed. Reg. 41,138, 41,146 (July 31, 1997). Note the GCVTC's definition did not include a specified time period. See REPORT OF THE GRAND CANYON VISIBILITY TRANSPORT COMMISSION TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY x (1996).

⁵¹¹ Regional Haze Regulations, Notice of Proposed Rulemaking, 62 Fed. Reg. 41,138, 41,146 (July 31, 1997).

⁵¹² *Id.* at 41,148.

⁵¹³ *Id.*

three years.⁵¹⁴ The revisions were supposed to include assessments of whether reasonable progress targets had been met, and strategies for meeting reasonable progress targets in the future.⁵¹⁵

The proposed rule also required states to analyze sources contributing to regional haze that might be subject to BART.⁵¹⁶ Such sources would be required to be identified within twelve months after promulgation of the final rule.⁵¹⁷ In addition, states would have been required to submit plans and schedules for evaluating BART for potential sources within three years after the final rule.⁵¹⁸ EPA believed that because regional haze is caused by the cumulative emissions of many sources, states should not engage in costly or lengthy studies to determine whether specific sources might impair visibility.⁵¹⁹ In EPA's opinion, the effect of BART in improving visibility needed to be evaluated in the aggregate.⁵²⁰ When states were considering specific sources for BART requirements, EPA wanted them to evaluate the degree of visibility improvement that could be expected if BART were imposed on *all* eligible sources, not just the specific sources under consideration.⁵²¹ EPA believed this part of the rule was necessary because it was difficult to attribute the effects of regionally transported pollutants to specific sources.⁵²²

⁵¹⁴ *Id.*

⁵¹⁵ *Id.*

⁵¹⁶ *Id.* at 41,149.

⁵¹⁷ *Id.*

⁵¹⁸ *Id.*

⁵¹⁹ *Id.*

⁵²⁰ *Id.*

⁵²¹ *Id.* The regulations promulgated in 1980 only provided for the BART process to be triggered by the Federal Land Manager. Visibility Protection for Federal Class I Areas, 45 Fed. Reg. 80,084, 80,091 (1980)

D. The 1999 Final Regional Haze Regulations

EPA published the final regional haze rules on July 1, 1999.⁵²³ As in the proposed rule, the final rule extended coverage of the program to all states for the purpose of regional haze visibility impairment.⁵²⁴ EPA cited several factors as its rationale for expanding the applicability of the program.⁵²⁵ First, EPA noted that section 169A requires it to promulgate regulations imposing SIP modifications from states where emissions might “reasonably be anticipated to cause or contribute to any impairment of visibility” in any mandatory Class I area.⁵²⁶ EPA relied in part on the 9th Circuit’s reasoning in *Central Arizona Water Conservation District v. EPA*,⁵²⁷ where the court interpreted identical language relating to BART in section 169A(b)(2)(A).⁵²⁸ In that case, the 9th Circuit found that Congress established a very low triggering threshold for requiring BART controls on sources that might reasonably be anticipated to contribute to

(codifying 40 C.F.R. §§ 51.302(c)(2)(iii), 51.302(c)(4)). BART analyses were only required for the specific facilities that might contribute to impairment within a Class I area identified by the Federal Land Manager. *Id.* In determining BART for a facility, states were authorized to consider the potential improvement in visibility that might reasonably be anticipated from imposing BART on that specific facility. *Id.*

⁵²² Regional Haze Regulations, Notice of Proposed Rulemaking, 62 Fed. Reg. 41,138, 41,150 (July 31, 1997).

⁵²³ Regional Haze Regulations, 64 Fed. Reg. 35,714 (July 1, 1999).

⁵²⁴ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,720, 35,763 (July 1, 1999) (amending 40 C.F.R. § 51.300(b)(3)). The final rule retained the exceptions for Puerto Rico, Guam, American Samoa, and the Northern Mariana Islands. *Id.* Hawaii, Alaska and the Virgin Islands were made subject to the program. *Id.*

⁵²⁵ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,721 (July 1, 1999).

⁵²⁶ *Id.*

⁵²⁷ 990 F.2d 1531 (9th Cir. 1993).

⁵²⁸ *Central Arizona Water Conservation District v. EPA*, 990 F.2d 1531, 1541 (9th Cir. 1993); Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,721 (July 1, 1999).

visibility impairment in mandatory Class I areas.⁵²⁹ EPA decided that the 9th Circuit's reasoning applied to the general SIP requirement in section 169A(b)(2), concluding that the threshold also was low for requiring SIPs from states whose emissions might reasonably be expected to contribute to impairment of visibility in mandatory Class I areas.⁵³⁰

EPA's second rationale for expanding the applicability of the program was the weight of evidence showing that long-range transport of fine particulates affects visibility in Class I areas.⁵³¹ EPA cited a large body of evidence that fine particulates contribute to regional haze and other related effects, such as acid rain, finding that particulates could be transported as far as hundreds or thousands of kilometers.⁵³² Also, sulfate had been determined to be the key contributor to visibility impairment in the central and eastern United States, and long-range transport of sulfate had been established by studies done for the acid rain program.⁵³³ Therefore, EPA found it reasonable to include states without Class I areas in the regional haze program, since many had emissions sources contributing to visibility impairment in Class I areas.⁵³⁴

1. Applying the GCVTC's Recommendations—40 C.F.R. § 51.309

⁵²⁹ Central Arizona Water Conservation District v. EPA, 990 F.2d 1531, 1541 (9th Cir. 1993); Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,721 (July 1, 1999).

⁵³⁰ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,721 (July 1, 1999).

⁵³¹ *Id.*

⁵³² *Id.* at 35,721-35,722.

⁵³³ *Id.* at 35,722.

⁵³⁴ *Id.*

EPA specifically addressed the GCVTC's recommendations in the final regional haze rule.⁵³⁵ Notably, EPA did not directly incorporate the GCVTC's emissions management strategies as SIP requirements.⁵³⁶ EPA reasoned that its program was intended to apply nationwide, and it could not determine how the GCVTC's recommendations could be made into SIP requirements that would apply nationwide.⁵³⁷ Instead, EPA sought public comment on how a nationwide program could include the GCVTC's recommendations.⁵³⁸ The result was a set of optional SIP requirements that could be used by the state and Tribal GCVTC members to comply with the regional haze rule.⁵³⁹ These SIP requirements were set forth in 40 C.F.R. § 51.309.⁵⁴⁰

In EPA's opinion, the approach in section 51.309 fully recognized the work of the GCVTC and acknowledged its successor entity, the Western Regional Air Partnership.⁵⁴¹ Generally, EPA accepted the GCVTC's analysis as an acceptable basis for SIP strategies, even though it was not reasonable to expect the national visibility goal to be achieved within the transport region by 2040, which was the end of the period reviewed by the GCVTC.⁵⁴² EPA emphasized that states within the Transport Region were free to develop their own control strategies. Section 51.309 was only intended to provide an

⁵³⁵ *Id.* at 35,748-35,758.

⁵³⁶ *Id.* at 35,748.

⁵³⁷ *Id.*

⁵³⁸ *Id.* at 35,749.

⁵³⁹ *Id.*

⁵⁴⁰ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,749, 35,769-35,773 (July 1, 1999); 40 C.F.R. § 51.309 (1999).

⁵⁴¹ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,749 (July 1, 1999); *see* discussion *infra* Part V.E.

⁵⁴² Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,750 (July 1, 1999).

expedited process for a Transport Region state to rely on the analyses, recommendations and agreements of the GCVTC if it chose to follow the GCVTC's recommendations in its SIP.⁵⁴³ In other words, states did not have to rely on the GCVTC's work, but if they chose to do so, section 51.309 provided the mechanism for that choice.⁵⁴⁴

Section 51.309, entitled "Requirements Related to the Grand Canyon Visibility Transport Commission," required specific emissions control strategies for a large portion of the Western U.S., and addressed different types of emissions sources.⁵⁴⁵ Specifically, the rule included separate provisions for stationary sources, mobile sources, fire, and dust.⁵⁴⁶ EPA noted that the GCVTC recommended SO₂ emissions reduction targets for the years 2000 and 2040, but did not recommend targets for any years within that time period.⁵⁴⁷ As a result, section 51.309 allows for an annex to the GCVTC report that would be used by EPA in establishing SO₂ emissions reduction targets for the time period between 2003 and 2018.⁵⁴⁸ EPA concluded that the emissions reductions strategies included in section 51.309 needed to be re-evaluated in 2018 in order to make sure they would continue to make reasonable progress in achieving the national visibility goal.⁵⁴⁹ Accordingly, the time period for SIPs submitted under section 51.309 will run from 2003

⁵⁴³ *Id.* at 35,749.

⁵⁴⁴ *Id.* at 35,748.

⁵⁴⁵ *Id.* at 35,750, 35,769-35,773; 40 C.F.R. § 51.309 (1999).

⁵⁴⁶ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,750, 35,770-35,771 (July 1, 1999); 40 C.F.R. §§ 51.309(d)(4-6) (1999).

⁵⁴⁷ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,750 (July 1, 1999).

⁵⁴⁸ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,750, 35,773 (July 1, 1999); 40 C.F.R. § 51.309(f) (1999).

⁵⁴⁹ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,750 (July 1, 1999).

to 2018.⁵⁵⁰ The SIP must project visibility conditions through 2018, expressed in deciviews, and accounting for visibility improvement measures taken under section 51.309.⁵⁵¹

Clean air corridors were addressed by requiring states to implement comprehensive emissions tracking strategies for such areas.⁵⁵² EPA asserted that such a system would ensure that the number of days with good visibility would increase over time, and not decrease in any Class I areas addressed by the GCVTC.⁵⁵³ Clean air corridors would be identified initially with reference to reports by the GCVTC Meteorology Subcommittee, but could be refined over time.⁵⁵⁴

Stationary sources were addressed through a combination of emissions reduction milestones and economic incentives.⁵⁵⁵ SIPs were required to include requirements for monitoring and reporting SO₂ emissions.⁵⁵⁶ Monitoring would have to be sufficient to determine whether there had been a thirteen percent reduction between 1990 and 2000,

⁵⁵⁰ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,751, 35,770 (July 1, 1999); 40 C.F.R. § 51.309(d)(1) (1999).

⁵⁵¹ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,751, 35,770 (July 1, 1999); 40 C.F.R. § 51.309(d)(2) (1999).

⁵⁵² Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,751, 35,770 (July 1, 1999); 40 C.F.R. § 51.309(d)(3) (1999).

⁵⁵³ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,751, 35,770 (July 1, 1999); 40 C.F.R. § 51.309(d)(3) (1999).

⁵⁵⁴ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,751, 35,770 (July 1, 1999); 40 C.F.R. § 51.309(d)(3) (1999).

⁵⁵⁵ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,751-35,752, 35,770-35,771 (July 1, 1999); 40 C.F.R. § 51.309(d)(4) (1999).

⁵⁵⁶ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,751-35,752, 35,770 (July 1, 1999); 40 C.F.R. § 51.309(d)(4)(i) (1999).

and whether milestones have been achieved afterwards.⁵⁵⁷ The milestones would be developed as part of an annex to the GCVTC report.⁵⁵⁸ SIPs were also required to contain criteria and procedures for market trading programs, implemented if reduction milestones are not achieved.⁵⁵⁹ The rule also required states to consider emission management options for particulate matter and NO_x.⁵⁶⁰ SIPs submissions were required to include assessments of emissions control strategies and the amount of visibility improvement expected from those strategies.⁵⁶¹ The assessments would also have to address emissions reduction milestones, potential market-based programs, long-term strategies, and BART requirements.⁵⁶²

With regard to mobile sources, the final rule required SIPs to address their contribution to regional haze.⁵⁶³ The mobile source provisions were drawn from the GCVTC's finding that mobile sources had to be addressed in any long term strategy for improving visibility on the Colorado Plateau.⁵⁶⁴ More specifically, the rule requires SIPs

⁵⁵⁷ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,751-35,752, 35,770 (July 1, 1999); 40 C.F.R. § 51.309(d)(4)(i) (1999).

⁵⁵⁸ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,751-35,752, 35,770, 35,773 (July 1, 1999); 40 C.F.R. §§ 51.309(d)(4)(i), 51.309(f)(1) (1999).

⁵⁵⁹ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,752, 35,770 (July 1, 1999); 40 C.F.R. § 51.309(d)(4)(ii) (1999).

⁵⁶⁰ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,752, 35,771 (July 1, 1999); 40 C.F.R. § 51.309(d)(4)(v) (1999).

⁵⁶¹ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,752, 35,771 (July 1, 1999); 40 C.F.R. § 51.309(d)(4)(v) (1999).

⁵⁶² Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,752, 35,771 (July 1, 1999); 40 C.F.R. § 51.309(d)(4)(v) (1999).

⁵⁶³ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,752, 35,771 (July 1, 1999); 40 C.F.R. § 51.309(d)(5) (1999).

⁵⁶⁴ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,752 (July 1, 1999).

to provide for emissions inventories for NO_x, SO₂, volatile organic compounds, elemental carbon, organic carbon and fine particulates.⁵⁶⁵ Inventories were required to be state-wide, and done annually from 2003 to 2018.⁵⁶⁶

Once the inventories were completed, the rule required states to determine whether mobile source emissions from any part of the state contributed, or were projected to contribute, significantly to visibility impairment in any of the 16 Class I areas on the Colorado Plateau.⁵⁶⁷ Any such area was required to have a mobile source emissions budget, as well as an emissions tracking system, and compliance demonstrations.⁵⁶⁸ The year 2005 was anticipated to be the year with the lowest mobile source emissions, so the 2005 inventory was particularly important, and areas with emissions budgets were required to demonstrate their lowest emissions during that year, unless the state chose an alternate year for such a demonstration.⁵⁶⁹ The mobile source provisions also required periodic reports to EPA on how the strategies recommended by the GCVTC were being implemented.⁵⁷⁰

⁵⁶⁵ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,752, 35,771 (July 1, 1999); 40 C.F.R. § 51.309(d)(5)(i) (1999).

⁵⁶⁶ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,752, 35,771 (July 1, 1999); 40 C.F.R. § 51.309(d)(5)(i) (1999).

⁵⁶⁷ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,752, 35,771 (July 1, 1999); 40 C.F.R. § 51.309(d)(5)(ii) (1999).

⁵⁶⁸ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,752, 35,771 (July 1, 1999); 40 C.F.R. §§ 51.309(d)(5)(iii)(A), (B) (1999).

⁵⁶⁹ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,752, 35,771 (July 1, 1999); 40 C.F.R. § 51.309(d)(5)(iii)(B) (1999).

⁵⁷⁰ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,752, 35,771 (July 1, 1999); 40 C.F.R. § 51.309(d)(5)(iv) (1999).

EPA noted the importance of fire with regard to visibility, and agreed with the GCVTC's conclusions on the subject.⁵⁷¹ 40 C.F.R. § 51.309(d)(6) required SIPs to document that all Federal, state and private prescribed fire programs consider the effects of smoke on visibility.⁵⁷² In this regard, SIPs were required to include several components for those programs, such as emission minimization, evaluation of smoke dispersion, alternatives to fire, public notification, monitoring, enforcement and program evaluation.⁵⁷³ SIPs had to identify and remove barriers to alternatives to burning, and implement enhanced smoke management programs that considered visibility along with health and nuisance issues.⁵⁷⁴ States were also required to establish emissions inventories and tracing systems for NO_x, elemental carbon, organic carbon, volatile organic compounds, and fine particulate emissions from all forms of fire (prescribed, wild, and agricultural).⁵⁷⁵

Road dust was also covered under the final rule.⁵⁷⁶ Section 51.309(d)(7) required states to assess the impact of dust on visibility in the sixteen Class I areas on the Colorado Plateau.⁵⁷⁷ If dust emissions were determined to be significant contributors to

⁵⁷¹ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,753 (July 1, 1999).

⁵⁷² Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,753, 35,771 (July 1, 1999); 40 C.F.R. § 51.309(d)(6)(i) (1999).

⁵⁷³ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,753, 35,771 (July 1, 1999); 40 C.F.R. § 51.309(d)(6)(i) (1999).

⁵⁷⁴ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,753, 35,771 (July 1, 1999); 40 C.F.R. §§ 51.309(d)(6)(iii), (iv) (1999).

⁵⁷⁵ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,753, 35,771 (July 1, 1999); 40 C.F.R. § 51.309(d)(6)(ii) (1999).

⁵⁷⁶ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,753-35,754, 35,771 (July 1, 1999); 40 C.F.R. § 51.309(d)(7) (1999).

⁵⁷⁷ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,753, 35,771 (July 1, 1999); 40 C.F.R. § 51.309(d)(7) (1999).

visibility impairment, states were required to implement emissions management strategies to address the impacts of such emissions.⁵⁷⁸ EPA noted that the GCVTC report did not find major impacts to visibility from road dust, even though vehicle miles traveled was expected to increase significantly over the period covered by the report.⁵⁷⁹ EPA did, however, agree with the GCVTC's approach to track emissions and focus on locations within and near Class I areas.⁵⁸⁰

As a result of the GCVTC's recommendations relating to air pollution prevention, EPA required SIPs to provide incentives for achieving compliance early or going beyond compliance.⁵⁸¹ The rule also focused on energy generation by requiring SIPs to identify new areas where renewable energy can provide power, project the benefits of renewable energy, describe programs implemented in order to help reach the GCVTC's renewable energy goals, and describe programs for energy conservation.⁵⁸²

EPA also included a provision requiring SIPs to include any other GCVTC recommendations that can be practicably included as enforceable measures for making reasonable progress toward the national visibility goal.⁵⁸³ 40 C.F.R. § 51.309 also contained provisions requiring periodic SIP revisions, and providing the states with the

⁵⁷⁸ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,753, 35,771 (July 1, 1999); 40 C.F.R. § 51.309(d)(7) (1999).

⁵⁷⁹ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,753-35,754 (July 1, 1999).

⁵⁸⁰ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,754 (July 1, 1999).

⁵⁸¹ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,754, 35,771 (July 1, 1999); 40 C.F.R. § 51.309(d)(8)(ii) (1999).

⁵⁸² Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,754, 35,771-35,772 (July 1, 1999); 40 C.F.R. §§ 51.309(d)(8)(iii), (iv), (v), (vi) (1999).

⁵⁸³ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,755, 35,772 (July 1, 1999); 40 C.F.R. § 51.309(d)(9) (1999).

ability to base their strategies on those coordinated with other states.⁵⁸⁴ With regard to air pollution from sources outside the U.S., EPA did not make states responsible for developing measures to offset the effects of emissions from foreign sources.⁵⁸⁵ However, EPA emphasized that states had a duty to work with EPA in appropriately addressing international transport of air pollution.⁵⁸⁶

2. General Program Requirements—40 C.F.R. § 51.308

States within the Transport Region addressed by the GCVTC that did not decide to follow the GCVTC's recommendations under section 51.309 were required to comply with section 51.308, which contained the general requirements for the regional haze program.⁵⁸⁷ Any such state was required to notify other states within the Transport Region and provide them information on the nature of its program.⁵⁸⁸ 40 C.F.R. § 51.308(b) governed submission of the first SIPs under the program.⁵⁸⁹ SIP submission was tied to whether an area was designated as nonattainment for fine particulate matter (PM_{2.5}) under NAAQS promulgated in 1997.⁵⁹⁰ Areas designated attainment or

⁵⁸⁴ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,755-35,756, 35,772 (July 1, 1999); 40 C.F.R. §§ 51.309(d)(10), (11) (1999).

⁵⁸⁵ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,755 (July 1, 1999).

⁵⁸⁶ *Id.*

⁵⁸⁷ *Id.* at 35,756, 35,765, 35,772; 40 C.F.R. §§ 51.308, 51.309(e) (1999). Section 51.309 defined a "Transport Region State" as one that is "included within the Transport Region addressed by the [GCVTC] (Arizona, California, Colorado, Idaho, Nevada, New Mexico, Oregon, Utah, and Wyoming)." 40 C.F.R. § 51.309(b)(2).

⁵⁸⁸ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,756, 35,772-35,773 (July 1, 1999); 40 C.F.R. § 51.309(e) (1999).

⁵⁸⁹ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,765 (July 1, 1999); 40 C.F.R. § 51.308(b) (1999).

⁵⁹⁰ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,765 (July 1, 1999); 40 C.F.R. § 51.308(b) (1999); National Ambient Air Quality Standards for Particulate Matter, 62 Fed. Reg. 38,652 (1997) (to be codified at 40 C.F.R. pt. 50).

nonclassifiable for PM_{2.5} were required to submit regional haze implementation plans within twelve months of being designated as such.⁵⁹¹ Areas designated as nonattainment had three years to submit regional haze implementation plans, but not later than December 31, 2008.⁵⁹² However, the U.S. Court of Appeals for the D.C. Circuit held the coarse particulate matter standard violated the CAA and suspended the fine and coarse standards shortly before EPA promulgated the Regional Haze Rule.⁵⁹³

States were authorized to defer addressing the core requirements of the program if they were actively participating in a regional planning process.⁵⁹⁴ However, they would still be required to submit SIPs by the required dates, with specific requirements.⁵⁹⁵ More specifically, their regional haze implementation plans would have to demonstrate and describe ongoing regional planning, with agreements to continue.⁵⁹⁶ Also, states would have to show that it was appropriate to participate in regional planning because their emissions contributed to visibility impairment in one or more Class I areas outside their

⁵⁹¹ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,765 (July 1, 1999); 40 C.F.R. § 51.308(b)(1) (1999). EPA expected to receive regional haze implementation plans for attainment areas between July 2003 and July 2004, because it anticipated sufficient data would be available for attainment designations by December 31, 2002. Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,723 (July 1, 1999).

⁵⁹² Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,765 (July 1, 1999); 40 C.F.R. § 51.308(b)(2) (1999).

⁵⁹³ *American Trucking Associations, Inc. v. Environmental Protection Agency*, 175 F.3d 1027, 1038, 1057 (D.C. Cir. 1999) (remanding the PM_{2.5} standard on May 14, 1999). On appeal, the U.S. Supreme Court remanded the case to the D.C. Circuit for further proceedings on issues relating to implementation of the new ozone standards. *Whitman v. American Trucking Associations, Inc.*, 531 U.S. 457 (2001); *NAAQS Public Health Standards Constitutional, Supreme Court Rules*, DAILY ENV'T REP. (BNA), Feb. 28, 2001, at AA-1.

⁵⁹⁴ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,765 (July 1, 1999); 40 C.F.R. § 51.308(c) (1999).

⁵⁹⁵ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,765 (July 1, 1999); 40 C.F.R. § 51.308(c)(1) (1999).

⁵⁹⁶ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,765 (July 1, 1999); 40 C.F.R. §§ 51.308(c)(1)(i), (iii) (1999).

borders, or other states contributed to visibility impairment in such areas within their borders.⁵⁹⁷ The submission would also have to include a list of all BART-eligible sources within the state, and the state was required to commit to addressing the recommendations of the regional planning organization.⁵⁹⁸ If a state satisfied these requirements, it could defer the core parts of the program until the latest date an area would otherwise be required to submit a plan, but not later than December 31, 2008.⁵⁹⁹

3. Core Requirements of the Regional Haze Program

The final rule included four core requirements for a regional haze implementation plan.⁶⁰⁰ The rule is intended to achieve natural visibility conditions in Class I areas by the year 2064, and maintained EPA's original approach of not allowing any degradation of the best visibility days.⁶⁰¹ The first core requirement was for states to establish goals, expressed in deciviews, providing for reasonable progress toward achieving natural visibility conditions.⁶⁰² States were required to consider the costs of compliance, the time necessary for compliance, the energy and non-air quality environmental impacts, and the

⁵⁹⁷ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,765 (July 1, 1999); 40 C.F.R. § 51.308(c)(1)(ii) (1999).

⁵⁹⁸ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,765 (July 1, 1999); 40 C.F.R. §§ 51.308(c)(1)(iv), (v) (1999).

⁵⁹⁹ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,765 (July 1, 1999); 40 C.F.R. § 51.308(c)(2) (1999).

⁶⁰⁰ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,766-35,767 (July 1, 1999); 40 C.F.R. §§ 51.308(d)(1-4) (1999).

⁶⁰¹ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,730-35,734, 35,766 (July 1, 1999); 40 C.F.R. §§ 51.308(d) (1999).

⁶⁰² Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,766 (July 1, 1999); 40 C.F.R. §§ 51.308(d)(1) (1999).

remaining useful life of any potentially regulated facility.⁶⁰³ States also were required to determine the rate of progress necessary to achieve natural visibility conditions by the year 2064.⁶⁰⁴ States were required to consult with each other if their emissions were reasonably anticipated to contribute to visibility impairment in a mandatory Class I area.⁶⁰⁵

The final rule did not include any presumptive targets required for reasonable progress, though such targets were included in the proposed rule.⁶⁰⁶ If a state's rate of progress would not achieve natural visibility by 2064, it was required to demonstrate why it was unreasonable to do so, and provide an assessment of how many years it would take to achieve natural conditions.⁶⁰⁷ However, states were not to be subjected to enforcement actions if they failed to reach reasonable progress targets.⁶⁰⁸ In this regard, EPA emphasized that the targets were merely goals, and that the enforceable requirement was

⁶⁰³ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,766 (July 1, 1999); 40 C.F.R. §§ 51.308(d)(1)(i)(A) (1999).

⁶⁰⁴ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,766 (July 1, 1999); 40 C.F.R. §§ 51.308(d)(1)(i)(B) (1999). The necessary rate of progress would be determined by comparing baseline visibility conditions to natural visibility conditions in the particular Class I area, with a calculation of the uniform rate of improvement needed to achieve natural visibility by 2064. Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,732, 35,766 (July 1, 1999); 40 C.F.R. §§ 51.308(d)(1)(i)(B) (1999). The years 2000 to 2004 would provide the baseline conditions. Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,732, 35,766 (July 1, 1999); 40 C.F.R. § 51.308(d)(2)(i) (1999).

⁶⁰⁵ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,766 (July 1, 1999); 40 C.F.R. §§ 51.308(d)(1)(iv) (1999).

⁶⁰⁶ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,731 (July 1, 1999); Regional Haze Regulations, Notice of Proposed Rulemaking, 62 Fed. Reg. 41,138, 41,145-41,146 (July 31, 1997).

⁶⁰⁷ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,766 (July 1, 1999); 40 C.F.R. § 51.308(d)(1)(ii) (1999).

⁶⁰⁸ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,733, 35,766 (July 1, 1999); 40 C.F.R. § 51.308(d)(1)(vi) (1999).

for the states to implement control measures.⁶⁰⁹ In addition, the final rule did not extend the concept of integral vistas to the regional haze program.⁶¹⁰ EPA did not believe it was necessary to do so, because regional haze causes a uniform reduction in visibility in all directions, regardless of whether the area viewed is considered an integral vista.⁶¹¹ The regional haze program is designed to improve visibility for all possible views one might find within a Class I area.⁶¹²

The second core requirement for SIPs was calculations of baseline and natural visibility conditions.⁶¹³ The final rule contained specific rules on determining baseline visibility conditions, and allowed for establishing a baseline when on-site monitoring data was not available.⁶¹⁴ Determining natural visibility conditions involved an estimation of the degree of impairment that would exist under natural conditions.⁶¹⁵

The third core requirement was for states to develop long-term strategies addressing regional haze visibility impairment for each mandatory Class I area within the state, and each mandatory Class I area outside the state that may be affected by the state's emissions.⁶¹⁶ Long term strategies were required to include enforceable emissions limits,

⁶⁰⁹ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,733, 35,766 (July 1, 1999); 40 C.F.R. § 51.308(d)(1)(vi) (1999).

⁶¹⁰ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,734 (July 1, 1999).

⁶¹¹ *Id.*

⁶¹² *Id.*

⁶¹³ *Id.* at 35,732-35,733, 35,766 (July 1, 1999); 40 C.F.R. § 51.308(d)(2) (1999).

⁶¹⁴ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,732-35,733, 35,766 (July 1, 1999); 40 C.F.R. § 51.308(d)(2) (1999).

⁶¹⁵ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,732-35,733, 35,766 (July 1, 1999); 40 C.F.R. § 51.308(d)(2)(iii) (1999).

⁶¹⁶ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,734, 35,766 (July 1, 1999); 40 C.F.R. § 51.308(d)(3) (1999). This requirement was drawn from CAA section 169A(b)(2)(B), which required SIPs

compliance schedules, and other measures necessary to meet the reasonable progress goals established by states in their SIPs.⁶¹⁷ The rule repeats the consultation requirement for states whose emissions may affect mandatory Class I areas in other states.⁶¹⁸ In addition, states were required to demonstrate that they had done everything necessary to reduce their shares of emissions affecting visibility in mandatory Class I areas.⁶¹⁹ States were also required to identify all anthropogenic sources of visibility impairment considered in developing their long-term strategies.⁶²⁰ In this regard, EPA recommended that states consider major and minor stationary sources, mobile sources, and area sources.⁶²¹ In other words, EPA encouraged states to consider any source that might contribute significantly to visibility impairment, regardless of whether it might be subject to BART or existing regulation.⁶²²

The fourth core requirement for regional haze implementation plans was for the states to develop monitoring strategies.⁶²³ These strategies were required to be

to include long term strategies of ten to fifteen years in duration in order to make reasonable progress toward the national visibility goal. CAA § 169A(b)(2)(B), 42 U.S.C. § 7491(b)(2)(B) (2000).

⁶¹⁷ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,734, 35,766 (July 1, 1999); 40 C.F.R. § 51.308(d)(3) (1999).

⁶¹⁸ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,735, 35,766 (July 1, 1999); 40 C.F.R. § 51.308(d)(3)(i) (1999).

⁶¹⁹ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,735, 35,767 (July 1, 1999); 40 C.F.R. §§ 51.308(d)(3)(ii), (iii) (1999).

⁶²⁰ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,735, 35,767 (July 1, 1999); 40 C.F.R. § 51.308(d)(3)(iv) (1999).

⁶²¹ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,735, 35,767 (July 1, 1999); 40 C.F.R. § 51.308(d)(3)(iv) (1999).

⁶²² *See* Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,735, 35,767 (July 1, 1999); 40 C.F.R. § 51.308(d)(3)(iv) (1999).

⁶²³ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,743, 35,767 (July 1, 1999); 40 C.F.R. § 51.308(d)(4) (1999).

representative of all of the mandatory Class I areas within each state.⁶²⁴ In addition, they had to be coordinated with monitoring strategies implemented under the program for reasonably attributable visibility impairment.⁶²⁵ States also had to provide for the establishment of any monitoring sites or equipment necessary to determine whether reasonable progress was being achieved.⁶²⁶

4. BART

An important aspect of the final regional haze rule is the provision relating to BART.⁶²⁷ EPA considered the BART requirements found in CAA section 169A to be one of the primary elements of visibility protection.⁶²⁸ As described above, Congress identified twenty-six categories of major stationary sources constructed between 1962 and 1977 potentially subject to BART requirements.⁶²⁹ These categories include virtually all major stationary sources constructed within that time period that emit any air pollutant which may reasonably be anticipated to impair visibility in a Class I area.⁶³⁰

In the final rule, EPA made the definition of “BART-eligible source” identical to the definition of “existing stationary facility,” intending to make it clear that both terms

⁶²⁴ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,744, 35,767 (July 1, 1999); 40 C.F.R. § 51.308(d)(4) (1999).

⁶²⁵ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,744, 35,767 (July 1, 1999); 40 C.F.R. § 51.308(d)(4) (1999).

⁶²⁶ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,744, 35,767 (July 1, 1999); 40 C.F.R. § 51.308(d)(4)(i) (1999).

⁶²⁷ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,737, 35,767 (July 1, 1999); 40 C.F.R. § 51.308(e) (1999); *see generally*, ARNOLD W. REITZE, JR., AIR POLLUTION CONTROL LAW: COMPLIANCE & ENFORCEMENT § 5-4 (forthcoming 2001).

⁶²⁸ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,737 (July 1, 1999); *see* CAA §169A(b)(2)(A), 42 U.S.C. § 7491(b)(2)(A) (2000).

⁶²⁹ CAA §§ 169A(b)(2)(A), (g)(7), 42 U.S.C. § 7491(b)(2)(A), (g)(7) (2000).

included the same collection of sources.⁶³¹ State SIPs were required to include emissions limitations representing BART, and schedules for compliance for each BART-eligible source, unless the state could demonstrate that an alternative would better achieve reasonable progress toward natural visibility.⁶³² States were required to list all BART-eligible sources, and determine BART for each source.⁶³³ The state's BART analysis was required to determine the best system of continuous emissions control technology available, and analyze the amount of visibility improvement achievable as a result of installing BART on all eligible sources.⁶³⁴ In other words, the actual benefits of installing BART on a particular source were irrelevant under the rule, because the BART analysis required states to consider the aggregate benefit of installing BART on all eligible sources.⁶³⁵ Moreover, one of the bases for EPA's nationwide approach to regional haze was that emissions from any of the lower forty-eight states could

⁶³⁰ *Id.*; see ARNOLD W. REITZE, JR., AIR POLLUTION CONTROL LAW: COMPLIANCE & ENFORCEMENT § 5-4 (forthcoming 2001).

⁶³¹ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,738, 35,763 (July 1, 1999); 40 C.F.R. § 51.301 (1999).

⁶³² Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,739, 35,767 (July 1, 1999); 40 C.F.R. § 51.308(e) (1999). One permissible alternative would be an emissions trading program, provided the state performs a full BART analysis and demonstrates that such a program would apply to all BART-eligible sources, and would achieve greater progress toward natural visibility conditions than BART. Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,741-35,743, 35,768 (July 1, 1999); 40 C.F.R. § 51.308(e)(2) (1999).

⁶³³ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,739-35,743, 35,767 (July 1, 1999); 40 C.F.R. § 51.308(e)(1)(i, ii) (1999).

⁶³⁴ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,738-35,741, 35,767 (July 1, 1999); 40 C.F.R. § 51.308(e)(1)(ii) (1999). BART was to be determined according to the factors found in CAA § 169A(g)(2): costs of compliance, energy and non-air quality environmental impacts of compliance, any existing pollution control technology at the source, the remaining useful life of the source, and the visibility improvement reasonably expected from the use of such technology. Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,738, 35,767 (July 1, 1999); 40 C.F.R. § 51.308(e)(1)(ii)(A) (1999); see CAA § 169A(g)(2), 42 U.S.C. 7491(g)(2).

⁶³⁵ ARNOLD W. REITZE, JR., AIR POLLUTION CONTROL LAW: COMPLIANCE & ENFORCEMENT § 5-4 (forthcoming 2001); see Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,738-35,741, 35,767 (July 1, 1999); 40 C.F.R. § 51.308(e)(1)(ii) (1999).

reasonably be expected to cause visibility impairment in Class I areas.⁶³⁶ Consequently, BART could be required for most every major stationary source in the lower forty-eight states constructed between 1962 and 1977.⁶³⁷

The Regional Haze Rule also included amendments to the original visibility regulations, making conforming changes and adding new definitions.⁶³⁸ In addition, the rulemaking discussed implementation of the program on Tribal lands, and Federal Land Managers were required to be consulted in the development of regional haze implementation plans.⁶³⁹ The Rule was appealed to the U.S. Court of Appeals for the D.C. Circuit, but the litigation has been held in abeyance while EPA considers administrative petitions for review and modification.⁶⁴⁰

E. The Western Regional Air Partnership

40 C.F.R. § 51.309(f) specifically called for an annex to the GCVTC's report, in order to complete the requirements of the visibility program.⁶⁴¹ States that chose to follow section 51.309 only would be considered to have complied with the regional haze regulations if a satisfactory annex to the GCVTC report was published by October 1,

⁶³⁶ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,721 (July 1, 1999).

⁶³⁷ ARNOLD W. REITZE, JR., AIR POLLUTION CONTROL LAW: COMPLIANCE & ENFORCEMENT § 5-4 (forthcoming 2001); *see* Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,738-35,741, 35,767 (July 1, 1999); 40 C.F.R. § 51.308(e)(1)(ii) (1999).

⁶³⁸ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,759, 35,763-35,765 (July 1, 1999).

⁶³⁹ *Id.* at 35,758, 35,769, 35,772; 40 C.F.R. §§51.308(i), 51.309(d)(12) (1999).

⁶⁴⁰ *E.g.*, *Haze Rule Opponents Ask Whitman for Dialogue on Administrative Fix*, CLEAN AIR REP., Feb. 15, 2001, at 12; *EPA Prepares to Deny Industry Petition to Reconsider Haze Rule*, CLEAN AIR REP., Dec. 21, 2000, at 14-15; *Industry Group Seeks Administrative Record on Development of EPA Regional Haze Rule*, DAILY ENV'T REP. (BNA), Oct. 8, 1999, at A-4.

⁶⁴¹ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,756, 35,773 (July 1, 1999); 40 C.F.R. § 51.309(f) (1999).

2000.⁶⁴² The primary purpose of the annex was to provide emissions milestones for stationary sources of SO₂, during the period between 2000 and 2040.⁶⁴³ Accordingly, the annex was required to contain emissions reduction milestones for SO₂, and provide for steady reductions meeting the GCVTC's definition of reasonable progress.⁶⁴⁴ It was also required to show that the emissions milestones exceeded that which would be achieved through BART.⁶⁴⁵ In addition, the annex had to contain a description of a market trading program, or an alternative program, to be implemented if the milestones were not met.⁶⁴⁶

The GCVTC recognized the need for a successor organization to “oversee, promote, and support many of the recommendations” in its report.⁶⁴⁷ That organization became the Western Regional Air Partnership (WRAP), established in 1997.⁶⁴⁸ WRAP's geographic coverage was broader than that of the GCVTC.⁶⁴⁹ It became responsible for

⁶⁴² Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,756, 35,773 (July 1, 1999); 40 C.F.R. § 51.309(f) (1999).

⁶⁴³ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,756, 35,773 (July 1, 1999); 40 C.F.R. § 51.309(f) (1999).

⁶⁴⁴ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,756, 35,773 (July 1, 1999); 40 C.F.R. § 51.309(f)(i) (1999).

⁶⁴⁵ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,756, 35,773 (July 1, 1999); 40 C.F.R. § 51.309(f)(i) (1999).

⁶⁴⁶ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,756, 35,773 (July 1, 1999); 40 C.F.R. § 51.309(f)(ii) (1999).

⁶⁴⁷ REPORT OF THE GRAND CANYON VISIBILITY TRANSPORT COMMISSION TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY iii, 74-77 (1996).

⁶⁴⁸ WESTERN REGIONAL AIR PARTNERSHIP, VOLUNTARY EMISSIONS REDUCTION PROGRAM FOR MAJOR INDUSTRIAL SOURCES OF SULFUR DIOXIDE IN NINE WESTERN STATES AND A BACKSTOP MARKET TRADING PROGRAM, AN ANNEX TO THE REPORT OF THE GRAND CANYON VISIBILITY TRANSPORT COMMISSION i, Section I.D (2000), available at <http://www.wrapair.org>.

⁶⁴⁹ *Id.* at Attachment E. WRAP's Annex to the GCVTC report did not specifically list all of its participants. *Id.* at Section I.D; see discussion *infra* Part V.B, and note 641 and accompanying text. It simply described WRAP as a stakeholder organization made up of states, tribes, federal agencies, environmental groups, and industry. WESTERN REGIONAL AIR PARTNERSHIP, *supra* note 648, at Section I.D. It appears that Idaho was the first additional participant, as it was included in WRAP's preliminary estimate of emissions allocations

implementing the GCVTC's recommendations, and published the required annex on September 29, 2000.⁶⁵⁰ The Annex specifically addressed stationary sources, and other WRAP forums will address other issues discussed in the GCVTC report, such as mobile sources, fire and road dust emissions.⁶⁵¹ The Annex was submitted to EPA as a stakeholder agreement, but it did not obligate its members unless they chose to implement the GCVTC's recommendations under the authority of 40 C.F.R. § 51.309.⁶⁵²

WRAP determined that SO₂ emissions for 1999 were approximately 690,000 tons.⁶⁵³ This was about twenty-two percent less than the GCVTC's 1990 baseline amount of 830,000 tons.⁶⁵⁴ As a result, WRAP concluded that the region had exceeded the GCVTC's goal of a thirteen percent reduction in SO₂ emissions by 2000.⁶⁵⁵ In order to implement the GCVTC's recommendation of steady reductions, WRAP proposed

among states and tribes. *Id.* at Appendix E. Current participants also include Montana, North Dakota, South Dakota, Washington, the Campo Band of Kumeyaay Indians (California), the Cortina Indian Rancheria (California), the Northern Cheyenne Tribe (Montana), the Salish and Kootenai Confederated Tribes (Montana), the San Felipe Pueblo (New Mexico), and the Shoshone-Bannock Tribes of Fort Hall (Idaho). Western Regional Air Partnership, WRAP Membership (Aug. 18, 2001), at <http://www.wrapair.org/WRAP/membership.htm>; Western Regional Air Partnership, WRAP Charter Part 2 (Aug. 18, 2001), at <http://www.wrapair.org/WRAP/rcharter.html>. Nevada is missing from the current list of participants. Western Regional Air Partnership, WRAP Membership (Aug. 18, 2001), at <http://www.wrapair.org/WRAP/membership.htm>; Western Regional Air Partnership, WRAP Charter Part 2 (Aug. 18, 2001), at <http://www.wrapair.org/WRAP/rcharter.html>.

⁶⁵⁰ WESTERN REGIONAL AIR PARTNERSHIP, *supra* note 648, at i, Section I.D.

⁶⁵¹ *Id.* at Section I.D.

⁶⁵² *Id.* at Section II; *see* 40 C.F.R. §§ 51.309(e), (f) (1999).

⁶⁵³ WESTERN REGIONAL AIR PARTNERSHIP, *supra* note 648, at ii, Section II.A.1. This included an allocation of 38,000 tons for two copper smelters that were not operating at the time the Annex was submitted. *Id.* at ii; *see id.* Sections II.A, II.A.2. These were noted in the Annex as BHP San Manuel and Phelps Dodge Corporation Hidalgo. WESTERN REGIONAL AIR PARTNERSHIP, *supra* note 648, at Sections II.A, II.A.2.

⁶⁵⁴ *Id.* a Section II.A.1.

⁶⁵⁵ *Id.* at Section II.A.1.a; REPORT OF THE GRAND CANYON VISIBILITY TRANSPORT COMMISSION TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY 10, 32 (1996).

interim milestones, as well as a milestone for the year 2018.⁶⁵⁶ The interim milestones provided for emissions reductions every five years.⁶⁵⁷

The proposed milestone for 2018 was 510,000 tons of SO₂ emissions.⁶⁵⁸ This amounted to an emissions reduction of approximately 320,000 tons between the years 1990 and 2018, a difference of about thirty-nine to forty-four percent.⁶⁵⁹ In WRAP's opinion, this milestone represented significant progress toward the GCVTC's goal of reducing SO₂ emissions by fifty to seventy percent by the year 2040.⁶⁶⁰ In addition, WRAP estimated that BART would achieve reductions totaling only about 170,000 tons by the year 2018, so WRAP asserted that its proposed milestone would exceed BART by a significant margin.⁶⁶¹

WRAP proposed to determine compliance with the milestones by comparing annually the average of the most recent three years of total regional emissions to the average of the milestones for the same three years.⁶⁶² For the year 2018, total emissions for that year would be compared with the 2018 milestone.⁶⁶³ If any milestone is exceeded, a trading program would be activated, and emissions would be allocated one

⁶⁵⁶ WESTERN REGIONAL AIR PARTNERSHIP, *supra* note 648, at ii, Section II.A.1.b.

⁶⁵⁷ *Id.*

⁶⁵⁸ *Id.* at ii, Section II.A. This included an allocation of 30,000 tons for the two copper smelters that were not operating at the time the Annex was submitted. *Id.* at ii, Sections II.A, II.A.2; *see infra* note 653. If these were not operating in the year 2018, the milestone would be 480,000 tons. WESTERN REGIONAL AIR PARTNERSHIP, *supra* note 648, at ii, Sections II.A, II.A.2.

⁶⁵⁹ *Id.* at Section II.A.1.b. The range depended on whether the BHP and Phelps Dodge smelters become operational again. *Id.* at Sections II.A.1.b, II.A.2; *see infra* notes 653, 658.

⁶⁶⁰ WESTERN REGIONAL AIR PARTNERSHIP, *supra* note 648, at ii, Section II.A.1.b.

⁶⁶¹ *Id.* at ii, Section II.A.1.c. The estimate of BART reductions was provided as Attachment C to the Annex. *Id.* at Attachment C.

⁶⁶² *Id.* at ii, Section II.A.3.b. The WRAP referred to these averages as "rolling" averages. *Id.*

year later.⁶⁶⁴ Sources would be required to comply with their allocations within five years of the year the milestone was exceeded.⁶⁶⁵ They would be able to comply by installing emissions controls in order to reduce their emissions below their allocation, by purchasing emissions credits, or by retiring the source.⁶⁶⁶ Sources that do not stay within their allocations would be subject to financial penalties and a two-to-one offset of future emissions for each excess ton.⁶⁶⁷ These penalties would apply even if the 2018 milestone is the only one exceeded.⁶⁶⁸

The Annex included detailed provisions for a model backstop trading program, similar to the acid rain trading program, that the affected states and Tribes could use to develop their own rules.⁶⁶⁹ WRAP also proposed an optional trigger for the backstop trading program.⁶⁷⁰ At the time of the 2013 SIP review, if the participating states and tribes reach a consensus that the 2018 milestone will not be achieved, they would have the option of triggering the trading program.⁶⁷¹ This option would be available regardless of whether the 2013 milestone is achieved, and was designed to ensure that the 2018 milestone would be reached.⁶⁷²

⁶⁶³ *Id.* at ii, Section II.A.3.c.

⁶⁶⁴ *Id.* at ii, Section II.A, II.D.1, III.D, III.D.7.

⁶⁶⁵ *Id.* at ii, Sections II.D.1, III.D.7.

⁶⁶⁶ *Id.* at ii.

⁶⁶⁷ *Id.* at ii, Sections II.A.3.c, III.A.6.c.

⁶⁶⁸ *Id.*

⁶⁶⁹ *Id.* at Section III.D, Attachment A, page A1.

⁶⁷⁰ *Id.* at ii, Section II.A.3.c.(iii).

⁶⁷¹ *Id.*

⁶⁷² *Id.*

VI. Developments After 2000

A. Regulation of Fuels

In the Final Regional Haze Rule, EPA listed several pending regulatory efforts that would benefit visibility.⁶⁷³ One such effort was the rule relating to Tier 2 vehicle emissions standards and gasoline sulfur controls.⁶⁷⁴ EPA's discussion of the final rule included a section on visibility.⁶⁷⁵ EPA noted that, despite improvements in visibility since 1990, impairment continues to be a serious problem in Class I areas, and Eastern visibility has not improved at all.⁶⁷⁶ EPA asserted that the Tier 2/gasoline sulfur rule would help improve visibility because it would reduce emissions of upwind particulates and precursors to particulates.⁶⁷⁷ The rulemaking included a summary of the GCVTC's findings relating to mobile sources, and noted that several western governors expressed support for the rule when they commented on the Regional Haze Rule.⁶⁷⁸

Another such effort was EPA's final rule relating to sulfur content in diesel fuel.⁶⁷⁹ The rulemaking noted that heavy-duty vehicles emit significant quantities of

⁶⁷³ Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,753 (July 1, 1999). EPA listed the low-emission-vehicle standards, combined Tier 2/gasoline sulfur standards, emission standards for on-road heavy-duty vehicles, potential particulate standards for on-road vehicles, potential diesel fuel sulfur standards, promotion of clean-burning fuels, standards for vapor recovery systems, and fuel standards for diesel locomotives, watercraft, airplanes and federal vehicles. *Id.*

⁶⁷⁴ Control of Air Pollution from New Motor Vehicles: Tier 2 Motor Vehicle Emission Standards and Gasoline Sulfur Control Requirements, Final Rule, 65 Fed. Reg. 6,698 (Feb. 10, 2000) (codified at 40 C.F.R. pts. 80, 85, 86).

⁶⁷⁵ *Id.* at 6,721

⁶⁷⁶ *Id.*

⁶⁷⁷ *Id.*

⁶⁷⁸ *Id.*

⁶⁷⁹ Control of Air Pollution from New Motor Vehicles, Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements, Final Rule, 66 Fed. Reg. 5,002 (Jan. 18, 2001).

particulates, NO_x, and SO_x that contribute to visibility impairment.⁶⁸⁰ EPA again summarized the GCVTC's findings on the importance of controlling mobile source emissions, emphasizing that the diesel sulfur rule will make important progress toward improving visibility nationwide.⁶⁸¹ Neither of the fuel rules has gone without controversy.⁶⁸²

B. BART Guidelines

EPA's most recent visibility effort is the proposed guidance on BART determinations under the regional haze rule.⁶⁸³ EPA Administrator Carol M. Browner signed proposed BART implementation guidance on January 12, 2001.⁶⁸⁴ However, publication of the proposed rule was delayed by the Bush administration before publication in the Federal Register.⁶⁸⁵ After review by the new administration, EPA decided to move forward with the proposed rule, but it was again delayed by the White

⁶⁸⁰ *Id.* at 5,027.

⁶⁸¹ *Id.*

⁶⁸² See, e.g., *Worries Over Supply Shortages Prompt EPA Changes in Low-Sulfur Gas Regulation*, DAILY ENV'T REP. (BNA), Apr. 16, 2001, at A-7; *GAO Probes EPA Diesel Sulfur Rule Implication for Fuel Shortages*, CLEAN AIR REP., Apr. 12, 2001, at 20; *Industry Coalition Asks Whitman for Review of Diesel Rule*, CLEAN AIR REP., Feb. 28, 2001.

⁶⁸³ See Proposed Guidelines for Best Available Retrofit Technology (BART) Determinations Under the Regional Haze Regulations, Proposed Rule, 66 Fed. Reg. 38,108 (July 20, 2001) (to be codified at 40 C.F.R. pt. 51) [hereinafter 2001 BART Guidelines].

⁶⁸⁴ *Browner Signs Proposed Haze Requirements*, CLEAN AIR REP., Jan. 18, 2001. The rule was the subject of some controversy. See *States, Industry Groups Request Review of Retrofit Requirements Under Haze Rule*, DAILY ENV'T REP. (BNA), Feb. 12, 2001, at A-1.

⁶⁸⁵ *Bush Team Casts Last-Minute Clinton Air Rules Into Regulatory Limbo*, CLEAN AIR REP., Feb. 1, 2001. The delay was part of a Bush Administration review of Clinton regulatory actions that had been started late in the Clinton Administration, but had not become effective. *Whitman Moves Forward With Proposal Providing States Guidance to Control Haze*, DAILY ENV'T REP. (BNA), May 30, 2001, at AA-1.

House Office of Management and Budget.⁶⁸⁶ It was finally published in the Federal Register on July 20, 2001.⁶⁸⁷

The proposed rule provides guidance for the states in setting BART requirements relating to the regional haze program.⁶⁸⁸ EPA proposed to add the BART Guidelines as Appendix Y to 40 C.F.R. Part 51.⁶⁸⁹ A corresponding amendment to 40 C.F.R. § 51.308(e)(1)(C) was also proposed, requiring states to use the guidelines for all BART determinations required under the regional haze rule.⁶⁹⁰ In addition, EPA proposed revisions to the 1980 regulations relating to visibility impairment reasonably attributable to specific sources.⁶⁹¹

With regard to reasonably attributable visibility impairment, EPA noted that parts of the 1980 BART Guidelines might be interpreted as finding that the applicable New Source Performance Standards (NSPS) qualify as the maximum achievable emissions control for existing sources.⁶⁹² EPA emphasized that, while this may have been the case when the 1980 regulations were promulgated, maximum controls for recent source retrofits have exceeded NSPS levels of control.⁶⁹³ For example, EPA cited parts of the

⁶⁸⁶ *Id.*; *Previously Announced Haze Guidance Delayed by OMB for Energy Impact Review*, DAILY ENV'T REP. (BNA), June 13 2001, at AA-1.

⁶⁸⁷ 2001 BART Guidelines, *supra* note 683, at 38,108.

⁶⁸⁸ *Id.*

⁶⁸⁹ *Id.* at 38,108-38,109.

⁶⁹⁰ *Id.* at 38,109.

⁶⁹¹ *Id.*

⁶⁹² *Id.*

⁶⁹³ *Id.*

1980 Guidelines that say a state would not be required to conduct a complete BART analysis if the state's established BART emissions limits were equivalent to the NSPS.⁶⁹⁴

In EPA's opinion, advances in SO₂ control technologies have gone well beyond the seventy percent minimum required by the NSPS, with reduced costs per ton of SO₂ controlled.⁶⁹⁵ EPA asserted that current technology provides for eighty-five to ninety percent reduction in SO₂ emissions.⁶⁹⁶ Hence EPA's ultimate conclusion that all BART analyses under the reasonably attributable visibility impairment program should consider controls more stringent than the NSPS.⁶⁹⁷

If promulgated as a final rule, the 2001 BART Guidelines will provide procedures the states will be required to use in implementing BART requirement under the regional haze program.⁶⁹⁸ The proposed guidelines are divided into six parts: identification of BART-eligible sources; identification of sources subject to BART; BART engineering analysis; cumulative visibility analysis; BART emissions limits; and the emissions trading program alternative.⁶⁹⁹

1. BART Eligibility

⁶⁹⁴ *Id.* (citing the 1980 BART Guidelines at 8, 11, 21).

⁶⁹⁵ *Id.* at 38,109-38,110. EPA referred to retrofits and retrofit agreements at the Hayden (Colorado), Navajo (Arizona), Centralia (Washington), and Mohave (Nevada) coal-fired power plants. *Id.* at 38,110.

⁶⁹⁶ *Id.*

⁶⁹⁷ *Id.*

⁶⁹⁸ *Id.* at 38,115.

⁶⁹⁹ *Id.* at 38,115-38,116. EPA recommended that states and Tribes include in their implementation plans a requirement that sources self-identify themselves as BART-eligible if they meet the criteria. *Id.* at 38,116.

EPA provided a step-by-step process for identifying BART-eligible sources.⁷⁰⁰ Step one simply requires states to determine whether the source at issue falls within one of the BART categories.⁷⁰¹ BART requirements only apply to sources in one of twenty-six categories listed in CAA section 169A(g)(7).⁷⁰² In this regard, EPA requested comment on potential interpretations of several source categories.⁷⁰³ For example, EPA requested comment on whether the steam electric plant category requires that individual boiler capacities be aggregated in order to determine whether the plant at issue exceeds the BART threshold of 250 million BTUs per hour heat input.⁷⁰⁴ The same interpretation was proposed for the fossil fuel boiler category, consistent with the PSD requirements, though EPA also proposed evaluating individual boilers to determine whether each is BART-eligible.⁷⁰⁵

The second step requires states to identify whether the source existed on August 7, 1977.⁷⁰⁶ EPA has interpreted this as requiring preconstruction or permit approvals, and beginning construction.⁷⁰⁷ In other words, EPA has defined “in existence” to mean the same thing as “commencement of construction” under the PSD regulations.⁷⁰⁸ Such

⁷⁰⁰ *Id.* at 38,116-38,117.

⁷⁰¹ *Id.* at 38,117.

⁷⁰² *Id.* at 38,118-38,119; 42 U.S.C. § 7491(g)(7) (2000).

⁷⁰³ 2001 BART Guidelines, *supra* note 683, at 38,118.

⁷⁰⁴ *Id.*

⁷⁰⁵ *Id.*

⁷⁰⁶ *Id.*

⁷⁰⁷ *Id.* Beginning construction includes the beginning of physical, on-site construction, or binding agreements for such construction that cannot be canceled without substantial loss. *Id.*; 40 C.F.R. § 51.301 (2000).

⁷⁰⁸ 2001 BART Guidelines, *supra* note 683, at 38,118; *see* 40 C.F.R. §§ 52.165(a)(1)(xvi), 52.21(b)(9).

sources could be BART-eligible even if they do not begin operations until several years after commencement of construction.⁷⁰⁹ However, if a source had not started actual operations before August 7, 1962, it would not be considered BART-eligible.⁷¹⁰ Also, the same rules relating to reconstruction under the NSPS program also apply to BART eligibility.⁷¹¹ Thus sources qualifying as reconstructed between August 7, 1962 and August 7, 1977 would be BART-eligible.⁷¹²

The proposed BART guidelines do not contain any specific provisions on source modifications.⁷¹³ EPA proposed that modifications would not affect a source's BART eligibility.⁷¹⁴ In other words, a modification would not bring a source into existence, as reconstruction would.⁷¹⁵ For example, if a source is *not* BART-eligible because it began operations before August 7, 1962, a modification would not make it BART-eligible, so long as it is not reconstructed.⁷¹⁶ Similarly, if a source is BART-eligible because it began operations between August 7, 1962 and August 7, 1977, it would remain BART-eligible if it is modified after August 7, 1977.⁷¹⁷

⁷⁰⁹ 2001 BART Guidelines, *supra* note 683, at 38,118.

⁷¹⁰ *Id.* at 38,119.

⁷¹¹ *Id.*

⁷¹² *Id.*

⁷¹³ *Id.*

⁷¹⁴ *Id.*

⁷¹⁵ *Id.*

⁷¹⁶ *Id.*

⁷¹⁷ *Id.*

The third step for BART eligibility would require states to compare potential emissions with the 250 tons-per-year (TPY) threshold for any single visibility-impairing pollutant.⁷¹⁸ These pollutants were listed as SO₂, NO_x, particulates, volatile organic compounds, and ammonia.⁷¹⁹ PTE under the regional haze rule means the maximum capacity of a stationary source to emit a pollutant under its physical and operational design, including federally enforceable limitations on operations.⁷²⁰ EPA also noted that, for the purpose of determining a source's total PTE, the issues relating to facility boundaries and common control of emissions sources are "very similar to" those the same issues addressed in the Title V and New Source Review programs.⁷²¹

The last step in determining BART eligibility requires identification of the emissions units and pollutants that constitute the BART-eligible source.⁷²² If the emissions from the units at a stationary source exceed the 250 TPY threshold for any single visibility-impairing pollutant, then that collection of units would be a BART-eligible source under the 2001 Guidelines.⁷²³ A BART analysis would be required for each visibility-impairing pollutant, even if emissions of some of them do not exceed the threshold, so long as at least one of them does exceed the threshold.⁷²⁴

2. Identification of Sources Subject to BART

⁷¹⁸ *Id.*

⁷¹⁹ *Id.*

⁷²⁰ *Id.*; 40 C.F.R. § 51.301. The definition is identical to the PSD definition. *See* 40 C.F.R. §§ 51.18, 51.166 (2000).

⁷²¹ 2001 BART Guidelines, *supra* note 683, at 38,120.

⁷²² *Id.*

⁷²³ *Id.*

⁷²⁴ *Id.*

Once BART-eligible sources are identified, the proposed guidelines required identification of the specific sources that will be subjected to BART.⁷²⁵ Such sources would be subject to BART if they are reasonably anticipated to cause or contribute to visibility impairment in a Class I area.⁷²⁶ EPA asserted that this finding should be reached whenever a BART-eligible source emits pollutants within a geographic region from which such pollutants can be transported downwind to a Class I area.⁷²⁷ EPA stated that these geographic regions extend for hundreds or thousands of kilometers, and therefore are large enough to include many BART-eligible sources.⁷²⁸ As a result, EPA would expect emissions within a state to contribute to regional haze in Class I areas within that same state.⁷²⁹ However, EPA recognized that a emissions from a state without any Class I areas may have only a trivial effect on visibility in Class I areas outside the state.⁷³⁰

3. The BART Engineering Analysis

After states have identified which sources are actually subject to BART, the 2001 Guidelines would require an engineering analysis to determine what control options are available for such sources.⁷³¹ This is actually the first part of the regional haze BART

⁷²⁵ *Id.*

⁷²⁶ *Id.* at 38,120-38,121.

⁷²⁷ *Id.* at 38,121.

⁷²⁸ *Id.*

⁷²⁹ *Id.*

⁷³⁰ *Id.*

⁷³¹ *Id.*

analysis.⁷³² The analysis is required to determine the best system of continuous emissions reduction, taking into account the statutory BART factors from CAA section 169A(g)(2).⁷³³ In this regard, EPA has sought comment on two approaches for the engineering analysis.⁷³⁴ Its preferred approach is for the analysis to be similar to the Best Available Control Technology review under the New Source Review Program.⁷³⁵ This would involve rank-ordering all available control technologies from most effective to least effective.⁷³⁶ Alternatives would then be eliminated, starting with the most effective, if the state demonstrates that the alternative is not justified, based on technical considerations, costs, energy implications, and non-air quality environmental impacts.⁷³⁷ The disfavored approach would move in the other direction, allowing the state to start its analysis at any of the less effective controls and then consider the additional emissions reductions, costs, and other aspects of more effective controls.⁷³⁸ Regardless of the approach, an engineering analysis would be required for each visibility-impairing pollutant emitted by a source.⁷³⁹

⁷³² *Id.*; see 40 C.F.R. § 51.308(e)(1)(ii)(A) (2000).

⁷³³ 2001 BART Guidelines, *supra* note 683, at 38,121; CAA § 169A(g)(2), 42 U.S.C. § 7491(g)(2) (2000). BART was to be determined based on the costs of compliance, energy and non-air quality environmental impacts of compliance, any existing pollution control technology at the source, the remaining useful life of the source, and the visibility improvement reasonably expected from the use of such technology. Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,738, 35,767 (July 1, 1999); 40 C.F.R. § 51.308(e)(1)(ii)(A) (1999); see CAA § 169A(g)(2), 42 U.S.C. 7491(g)(2).

⁷³⁴ 2001 BART Guidelines, *supra* note 683, at 38,121.

⁷³⁵ *Id.*

⁷³⁶ *Id.*

⁷³⁷ *Id.*

⁷³⁸ *Id.* at 38,121-38,122.

⁷³⁹ *Id.* at 38,122.

In essence, the engineering analysis would involve five steps: identifying all available retrofit control technologies; elimination of the technically infeasible options; rank-ordering of remaining control technologies by effectiveness; evaluation of the impact; and selection of the best system.⁷⁴⁰ All available technologies would include any air pollution control technology with practical potential for being applied to the unit.⁷⁴¹ However, EPA “do[es] not expect the source owner to purchase or construct a process or control device that has not already been demonstrated in practice.”⁷⁴² Step two requires an evaluation of the feasibility of the technologies with practical potential for application to the source.⁷⁴³ As discussed above, options would be required to be ranked in order of their effectiveness and evaluated according to the statutory BART factors.⁷⁴⁴ Once this is done, the best alternative would be selected according to EPA’s chosen method, also discussed above.⁷⁴⁵

4. Visibility Impacts Analysis

The second part of the regional haze BART analysis requires a visibility impacts analysis.⁷⁴⁶ This would require a regional modeling analysis addressing the total regional visibility improvement which would result if all sources subject to BART actually

⁷⁴⁰ *Id.*

⁷⁴¹ *Id.*

⁷⁴² *Id.*

⁷⁴³ *Id.* at 38,123.

⁷⁴⁴ *Id.* at 38,125-38,130; *see infra* note 733.

⁷⁴⁵ 2001 BART Guidelines, *supra* note 683, at 38,130-38,131; *see infra* notes 734-738 and accompanying text.

⁷⁴⁶ 2001 BART Guidelines, *supra* note 683, at 38,131; 40 C.F.R. § 51.308(e)(1)(ii)(B).

installed the best controls, as determined by the engineering analysis.⁷⁴⁷ EPA expected that there would be a sufficient basis for BART controls if the cumulative visibility improvement is a “substantial fraction” of the improvement that is achievable, or is a “substantial fraction” of the visibility goal selected for any relevant Class I area.⁷⁴⁸ In the alternative, the controls would be justified if the cumulative visibility improvement would be necessary to prevent any degradation of the best visibility days in any relevant Class I area.⁷⁴⁹

5. Completing the BART Analysis

The last part of the BART process would require states to establish enforceable emissions limits, and require compliance with those limits within five years of SIP approval.⁷⁵⁰ EPA emphasized that sources must use monitoring techniques that will ensure continuous compliance.⁷⁵¹ However, continuous emissions monitoring would not necessarily be required under the 2001 Guidelines.⁷⁵² Any permit would have to be sufficient to show compliance or noncompliance, and must include provisions that are sufficient to allow the state to determine compliance.⁷⁵³

⁷⁴⁷ 2001 BART Guidelines, *supra* note 683, at 38,131. EPA noted that it is currently developing guidelines for regional air quality modeling. *Id.*

⁷⁴⁸ *Id.*

⁷⁴⁹ *Id.*

⁷⁵⁰ *Id.*

⁷⁵¹ *Id.*

⁷⁵² *Id.* at 38,131-38,132.

⁷⁵³ *Id.* at 38,132.

The final section of the proposed BART guidelines provided general guidance on developing an emissions trading program.⁷⁵⁴ Consistent with the WRAP's proposed program, states would have the option of implementing a trading program instead of BART.⁷⁵⁵ Such a program would include BART sources, but could also include sources not subject to BART.⁷⁵⁶ Also consistent with the WRAP's proposal, a trading program would be implemented through the year 2018, as opposed to the BART implementation requirement of five years from SIP approval.⁷⁵⁷ EPA anticipated such programs would be of the cap and trade variety, similar to the acid rain program.⁷⁵⁸

VII. Conclusion

The current visibility regulations, found in 40 C.F.R. Part 51, are a combination of the 1980 regulations and the final regional haze rule.⁷⁵⁹ Over the years, writers have been critical of the program.⁷⁶⁰ For example, one writer referred to the air quality related values test as a failure, in part describing it as an ineffective effort to build discretion into

⁷⁵⁴ *Id.* at 38,132-38,135.

⁷⁵⁵ *Id.* at 38,132; *see infra* notes 669-672 and accompanying text.

⁷⁵⁶ 2001 BART Guidelines, *supra* note 683, at 38,132.

⁷⁵⁷ *Id.*

⁷⁵⁸ *Id.* at 38,132 n.20.

⁷⁵⁹ *See* 40 C.F.R. pt. 51 (2000); Regional Haze Regulations, 64 Fed. Reg. 35,714 (July 1, 1999) (codified at 40 C.F.R. pt. 51); Visibility Protection for Federal Class I Areas, 40 Fed. Reg. 80,084 (Dec. 2, 1980) (codified at 40 C.F.R. pt. 51); Vickie Patton & Bruce Polkowsky, *The EPA's Regional Haze Proposal: Protecting Visibility in National Parks and Wilderness Areas*, 11 TUL. ENVTL. L.J. 299, 307-308, 318-330 (1998).

⁷⁶⁰ *E.g.* ARNOLD W. REITZE, JR., AIR POLLUTION CONTROL LAW: COMPLIANCE & ENFORCEMENT §§ 5-3, 5-4 (forthcoming 2001); Marilyn S. Kite, Edward W. Harris & Mary A. Throne, *Visibility: A Critique of the National Program; A Review of the Impacts in Southwest Wyoming*, 23 LAND & WATER L. REV. 3 (1998); Craig N. Oren, *The Protection of Parklands From Air Pollution: A Look at Current Policy*, 13 HARV. ENVTL. L. REV. 313 (1989).

the visibility program.⁷⁶¹ That same writer was similarly critical of CAA § 169A.⁷⁶²

Other writers have criticized the relevant statutes for being vague, and the regional haze rule as being deceptively simple.⁷⁶³

Despite these criticisms, it is clear that EPA has approached the visibility problem from a number of directions, and appears to be attempting to follow the GCVTC's recommendations.⁷⁶⁴ When it enacted the visibility provisions of the Clean Air Act, Congress created a complex program, and tasked EPA with solving a very complex problem.⁷⁶⁵ Perhaps the only fair assessment of the program would be to conclude that EPA is doing the best it can.⁷⁶⁶

⁷⁶¹ Craig N. Oren, *The Protection of Parklands From Air Pollution: A Look at Current Policy*, 13 HARV. ENVTL. L. REV. 313, 368-389 (1989).

⁷⁶² *Id.* at 389-398; see 42 U.S.C. § 7491 (2000).

⁷⁶³ Marilyn S. Kite, Edward W. Harris & Mary A. Throne, *Visibility: A Critique of the National Program; A Review of the Impacts in Southwest Wyoming*, 23 LAND & WATER L. REV. 3, 6 (1998).

⁷⁶⁴ See 40 C.F.R. pt. 51 (2000); Proposed Guidelines for Best Available Retrofit Technology (BART) Determinations Under the Regional Haze Regulations, Proposed Rule, 66 Fed. Reg. 38,108 (July 20, 2001) (to be codified at 40 C.F.R. pt. 51); Control of Air Pollution from New Motor Vehicles, Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements, Final Rule, 66 Fed. Reg. 5,002 (Jan. 18, 2001) (codified at 40 C.F.R. pts. 80, 85, 86); Control of Air Pollution From New Motor Vehicles: Tier 2 Motor Vehicle Emission Standards and Gasoline Sulfur Control Requirements, Final Rule, 65 Fed. Reg. 6,698 (Feb. 10, 2000) (codified at 40 C.F.R. pts. 80, 85, 86); Regional Haze Regulations, 64 Fed. Reg. 35,714, 35,748-35,758 (July 1, 1999); Visibility Protection for Federal Class I Areas, 40 Fed. Reg. 80,084 (Dec. 2, 1980) (codified at 40 C.F.R. pt. 51).

⁷⁶⁵ See generally, ARNOLD W. REITZE, JR., AIR POLLUTION CONTROL LAW: COMPLIANCE & ENFORCEMENT §§ 5-3, 5-4 (forthcoming 2001); Marilyn S. Kite, Edward W. Harris & Mary A. Throne, *Visibility: A Critique of the National Program; A Review of the Impacts in Southwest Wyoming*, 23 LAND & WATER L. REV. 3 (1998); Craig N. Oren, *The Protection of Parklands From Air Pollution: A Look at Current Policy*, 13 HARV. ENVTL. L. REV. 313 (1989).

⁷⁶⁶ See Marilyn S. Kite, Edward W. Harris & Mary A. Throne, *Visibility: A Critique of the National Program; A Review of the Impacts in Southwest Wyoming*, 23 LAND & WATER L. REV. 3, 32 (1998).